

COOP'S
SATELLITE
DIGEST



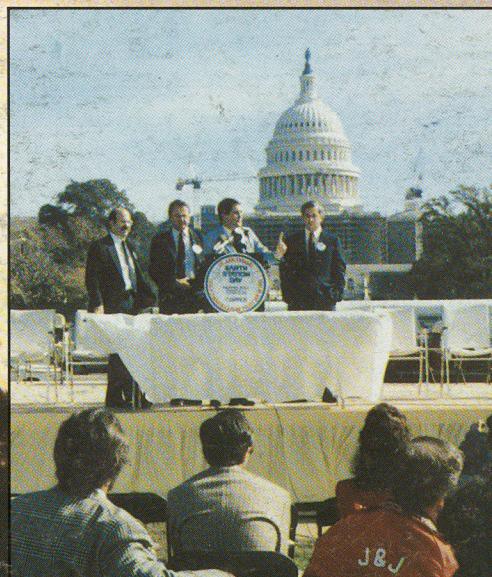
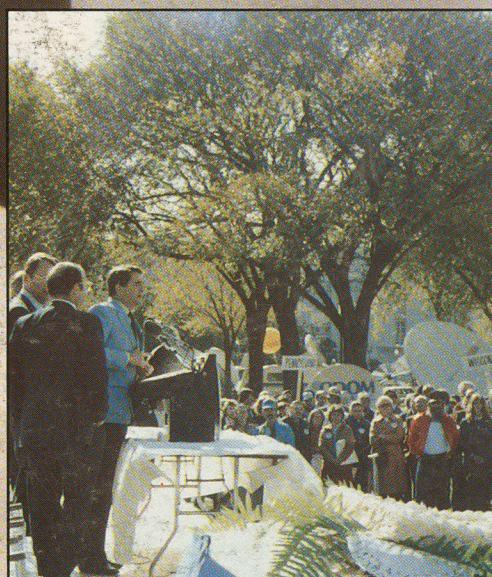
December 15, 1985

**Product Review of
the TV Genie**

**Spectrum Analyzers
Part III**

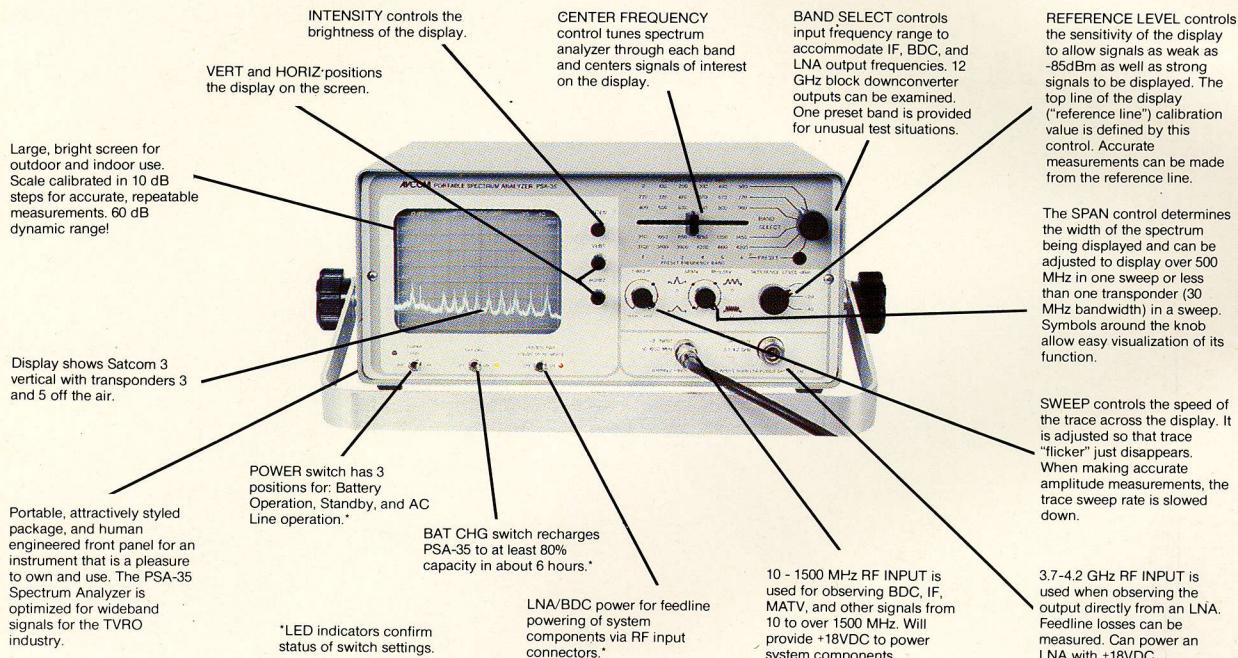
**Earth Station Day
in Washington**

Cable's Twilight



AVCOM's PSA-35 Portable Spectrum Analyzer

Designed with you in mind— Basic enough to begin with— Sophisticated enough to grow with!



KEYWORD EXPLANATIONS

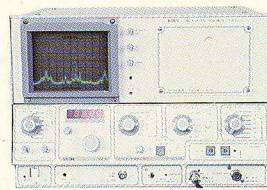
SPECTRUM ANALYZER — an instrument used to display signal amplitude vs. frequency over a selected range of frequencies (bandwidth). Amplitude is shown by the height of the trace on the screen.

REFERENCE LEVEL — in our context, a line at the top of the display that defines signal level at that point. Equally spaced lines below it at 10 dB intervals enable easy readout of various signal levels.

dBm — the most useful unit of measurement of signal strength (power) for our industry. It means decibel referenced to 1/1,000 of a watt of power. The following list will help you put dBm values into perspective:

- +20dBm — 100 mw (1/10 watt)
- +10dBm — 10 mw (1/100 watt)
- 0 dBm — 1 mw (1/1,000 watt)
- 10dBm — .1 mw
- 40 dBm — .0001 mw (typical BDC output)
- 70 dBm — typical 4 GHz feedline signal

FOR DEMANDING BENCH-TEST SITUATIONS, AVCOM'S MSA-85 SPECTRUM ANALYZER



- Digital Frequency Readout
- Accurate Enough for Production and Lab Use
- Built-in DC Block and Power for LNA
- Sophisticated Styling
- Reliable Design

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Measure and document TVRO system performance after installation or service. Customer should be given copy of results per AVCOM's SASAR (Spectrum Analyzer System Analysis Report) to insure customer confidence and satisfaction.

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(More applications in our next series of ads — send us yours for publication.)

AVCOM's high performance spectrum analyzers become even more attractive when price is considered. The PSA-35 is \$1965 and the MSA-85 is priced at \$5345. Nothing on the market offers their performance at a comparable price.

Progressive TVRO Dealers, Repair Centers, and Manufacturers will find AVCOM's Spectrum Analyzers to be indispensable instruments for rapid testing and alignment of satellite equipment. Problems that might otherwise take hours, even days to resolve, can be identified and corrected in minutes, saving money and time, and reinforcing customers' confidence and trust. It is difficult to express in writing the diagnostic power a technician has with an AVCOM Spectrum Analyzer. In terms of time saved and customer good will, an AVCOM Spectrum Analyzer will pay for itself quickly.

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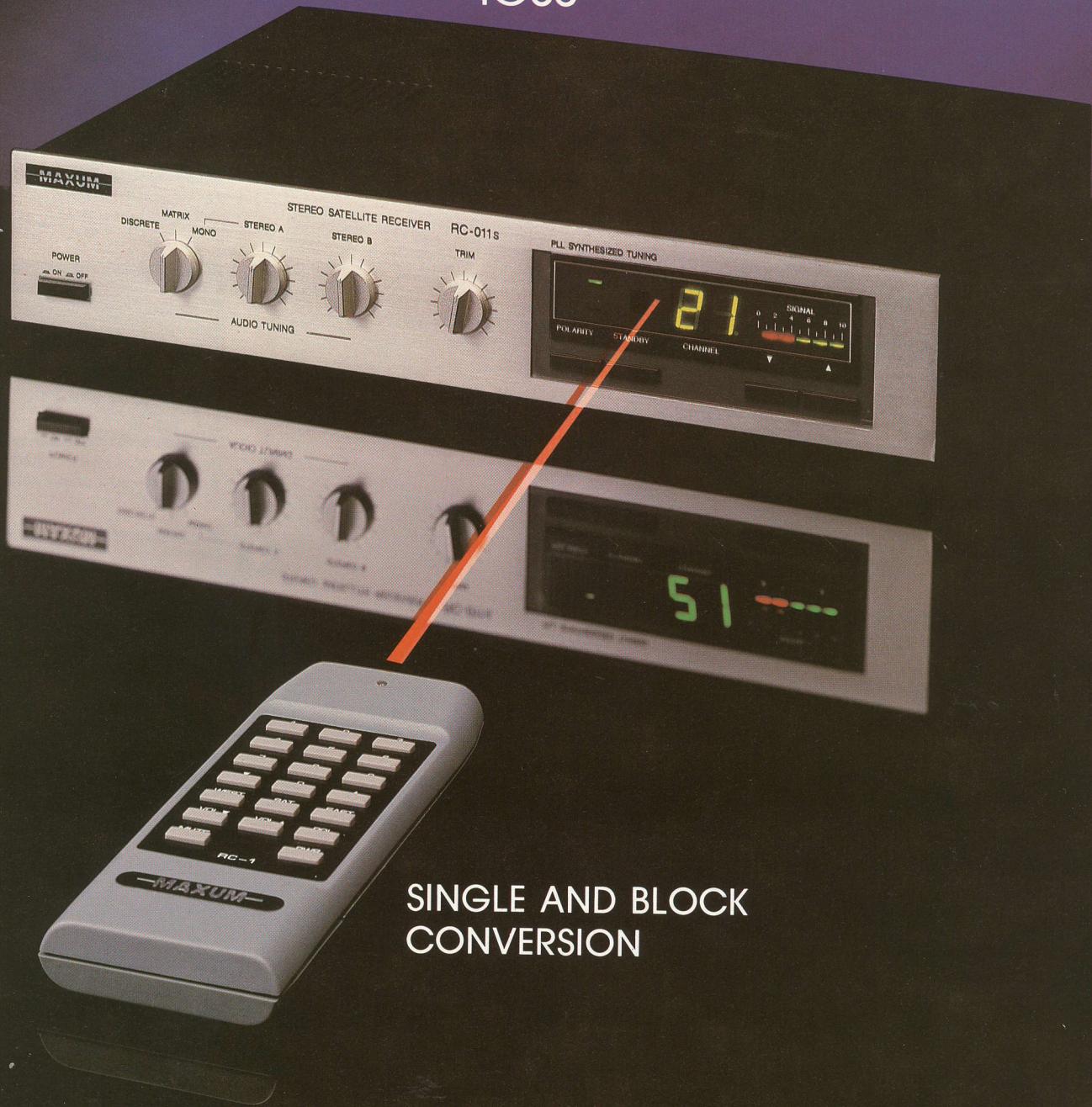
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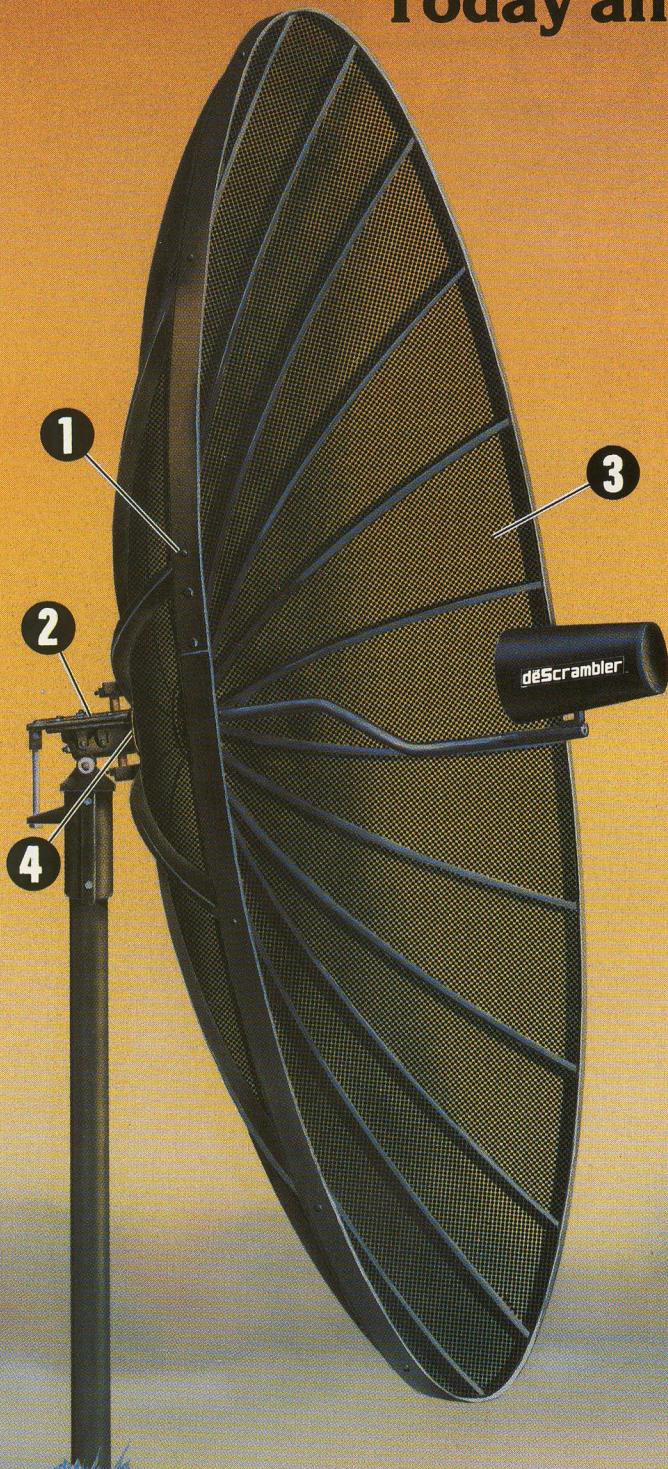
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for a good deal
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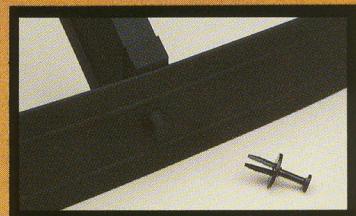
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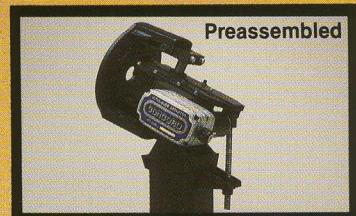


1



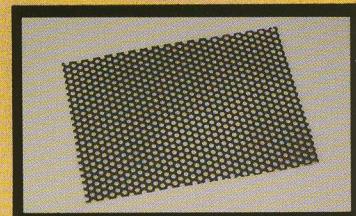
Snap together rim for easy installation

2



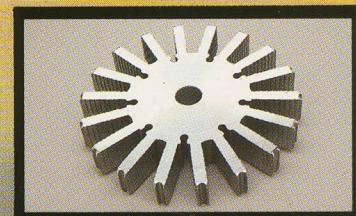
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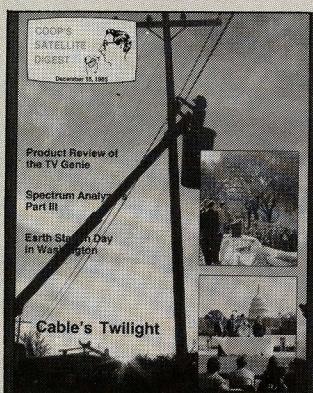
NSC 

DECEMBER
1985

COOP'S

SATELLITE DIGEST

Our Cover/ Cable television's fading light. It all started in 1949 in Astoria, Oregon, growing steadily throughout America. Now, cable appears to be peaking out and its interim-technology status is threatened by direct satellite reception which eliminates the cable middleman. See Coop's Comments in this issue.



Product Review 32

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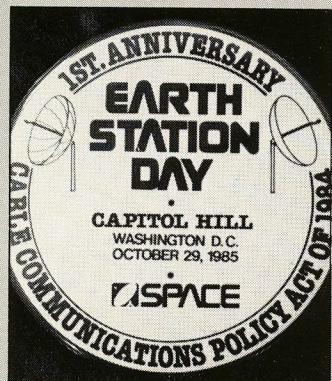
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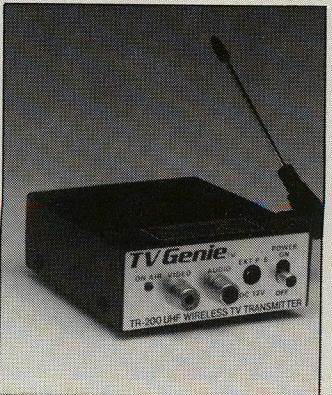
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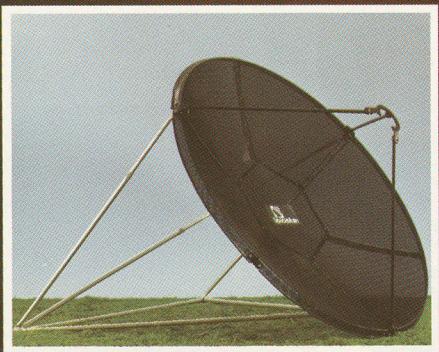


Genie 30

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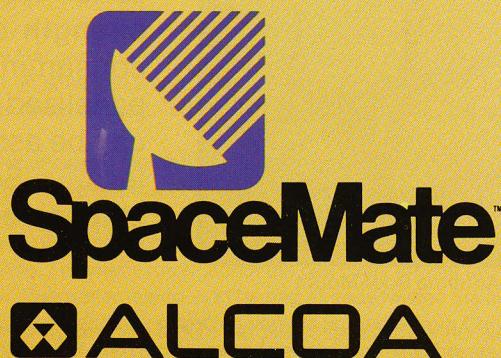
And now SpaceMate is available with either a true polar mount or a lightweight, all-aluminum AZ-EL Patio mount that includes easy-to-follow instructions and a highly accurate aiming device for do-it-yourself assembly and aiming (only 10 minutes required). Both mount designs are low-cost and UPS-shippable, so you can offer customers the application that best fits their budgets.

Best of all, SpaceMate is available for immediate delivery.

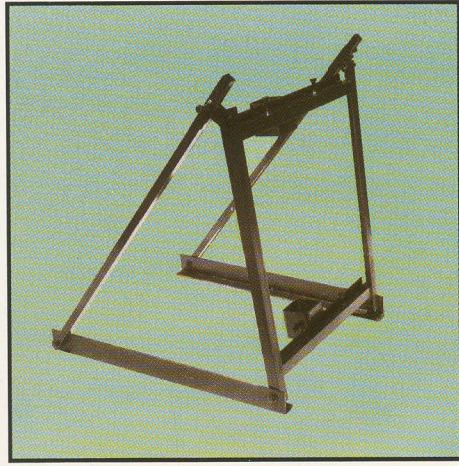
If you're one of those skeptics who thought you'd never be satisfied with the performance of a six-foot dish, why not get more details, or even a free demonstration? Distributors contact THE STOLLE CORPORATION, a subsidiary of Aluminum Company of America, 1501 Michigan Street, P.O. Box 221, Sidney, OH 45365. Phone: 1-800-556-3203.

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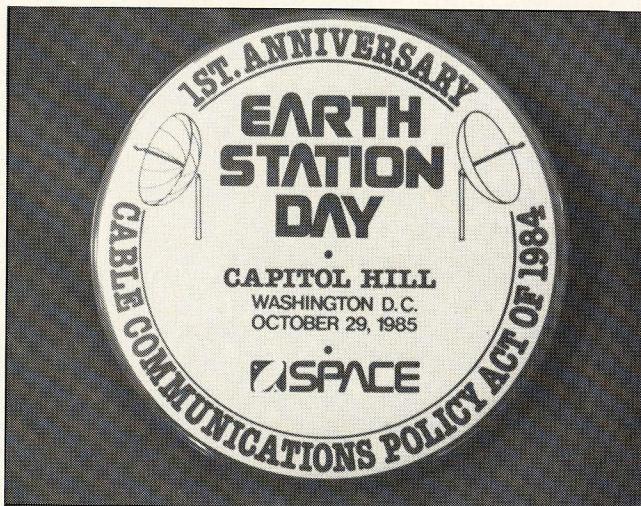
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Coop's Satellite Comments



COLLECTIBLE/ This badge helped commemorate the event.

ESD '85

Earth Station Day began as a technique to one-up the cable folks in Washington. For more than a decade, cable operators have made regular 'pilgrimages' to Washington. They do it in state groups; several Texas cable operators, for example, select a couple of days and with the help of NCTA, they arrange meetings with their Congressmen and Senators. The NCTA briefs each state or regional group on the issues of the day, and then accompanies the cable operators to the hill and through the myriad of offices. Inside, the cable operators twist arms on aides and representatives and generally try to make points for legislation of interest to cable folks. Yes, that would have included legislation pertaining to TVRO this fall.

The Texas cable operators (since we are using them as an example) managed to bring 25 cable people to Washington; it turned out to be the same week as the TVRO industry was holding its Earth Station Day celebration on the mall. I hope they felt outnumbered by us.

Cable people didn't think up this annual pilgrimage; broadcasters have been doing just that for decades. My history is weak on the point, but I suspect the telegraph operators did it before the broadcasters and probably the Indian smoke signalers did it before that. Fall is simply a prime-time to go and visit Congress. Spring is almost as good.

Murky origins surround this fall's celebration. I'm not sure we will ever be able to award a plaque to some single individual who put it all together in his (or her) mind. Certainly Chuck Hewitt gets some credit,



CONVOY ARRIVES/ Nearly 25 antennas trailered from Miami to Washington picking up participants along the way. Here, just after 5 PM on the 28th, the convoy pulls into the Mall parking lot.

which he probably deserves, for bringing the diverse elements together. Dealers such as Frank Abruzzo should get some credit as well. I didn't think it was a very good idea at first but I soon decided it would be OK. Bob Behar straightened me out.

"Am I crazy or what???" he asked on the telephone. "I have just volunteered US to put together 14 hours of live television coverage of the celebration. I've already arranged for a full production van with nine cameras, two microwave links, and a crew of a dozen or so. Can we do it???"

My automatic response was similar to the response Tonto gave the Lone Ranger as a band of Indians surrounded the duo on a lonely plain. In case you weren't there, Tonto said: "What band of Indians, White Man!" I substituted Cuban for White Man. Bob didn't think it was funny.

Behar caught me on the telephone only minutes away from a planned trip to the islands. He wanted to outline 14 hours of live television coverage in a 20 minute telephone call. I wanted to finish packing my bags. I told him we could sit down and talk about it a few days later in Orlando. I promptly forgot about the call until I arrived at the Orlando show. Bob remembered, and he had already twisted the arm of Chris Schultheiss and had extracted various promises from Chris concerning getting all of the printed press media together to help out with what

COOP/ continued on page 62



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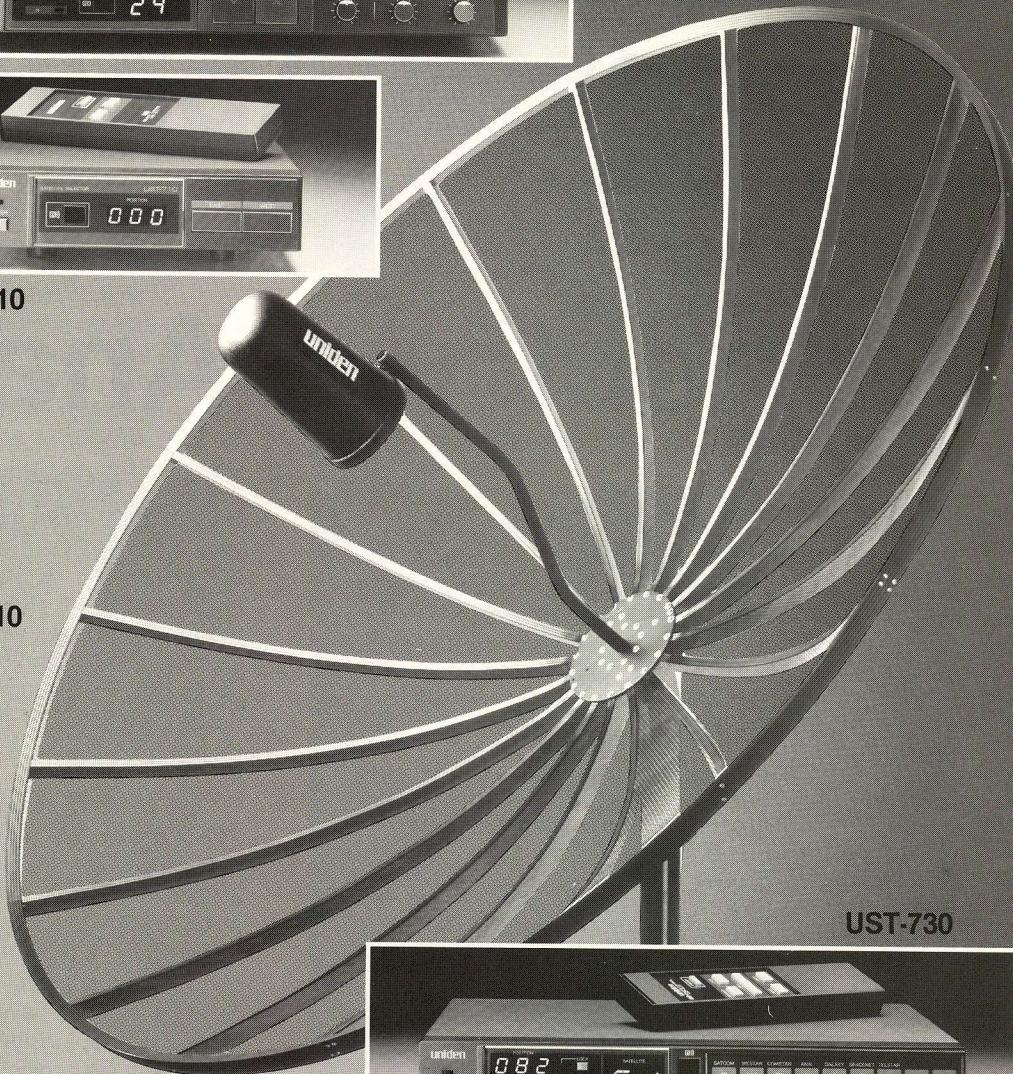
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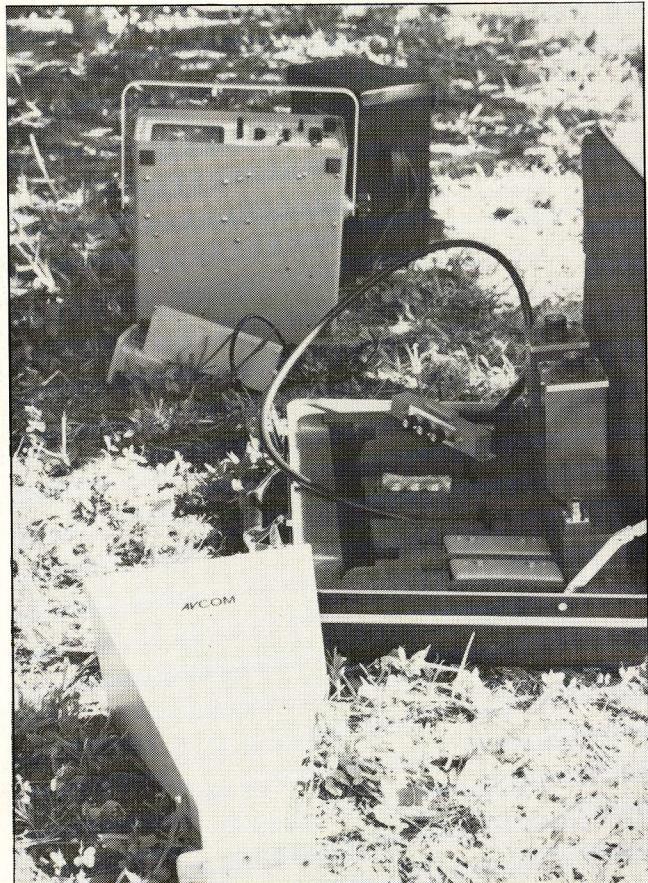


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Practical Application of the Spectrum Analyzer



THE WELL EQUIPPED DEALER/TISH-40 (AVCOM) horn (front), MFC Sky Doc kit (center), LNB or A, AVCOM PSA-35 and Luly analyzers.

To Work

Over the past two issues of CSD we have been investigating the wondrous operating systems found in a device known as a spectrum analyzer. We have learned that the analyzer is a measurement device created to allow the user to 'see' signals, either alone (one at a time) or in some user-selecting grouping (two, three, or more at a time). We have also learned that the analyzer replaced the normal meter face display with a CRT, or cathode ray tube, and that the CRT is the same basic device we view in most television sets.

The picture from an analyzer is a series of spikes, or lines,

and the faceplate on the CRT is, in turn, calibrated with an overlay which helps the user tell more about the spikes and lines of the display. The analyzer has various operating controls to allow the user to calibrate his display for signal level intensity (i.e. signal strength) and frequency. Most analyzers provide the user with the ability to zoom in and zoom out on specific, selected portions of the frequency spectrum being investigated. This, in turn, allows careful visual study of the signal characteristics for either a relatively narrow chunk of spectrum or an entire block of frequencies, such as a TVRO block IF.

Two recently introduced analyzers are available to the TVRO dealer. We have been looking at the Luly Telecommunications spectrum analyzer, created with only TVRO installations in mind. And, we have also been reviewing the AVCOM PSA-35 spectrum analyzer.

Basically, a properly designed spectrum analyzer is just about the most useful tool the installing or trouble shooting TVRO dealer can have at his or her disposal. You will learn more about your installation, and the actual operating condition of both the equipment pieces, (as well as the full system) in a shorter period of time with an analyzer than with any other single piece of test equipment.

Finding TI

One of the most harrowing tasks faced by a dealer operating in an area where TI is a potential problem is deciding when there is TI, where the TI exists, and how severe the TI may be. Several of the TI trap manufacturers insist that the dealer pinpoint the level and frequency of the TI before he orders various traps to insert into a system. There are various techniques for doing this but none is quicker than the spectrum analyzer. We took the Luly and AVCOM units into the field with the assistance of Fort Lauderdale's Satellite Link dealership and put recently elected SPACE Dealer Board President Frank Abruzzo to work. Assisting Abruzzo was his by-now well known cracker-jack ace engineer Alli Lake (the same Alli Lake who infiltrated the M/A-Com descrambler project last spring as a CSD undercover agent).

Lake packed up the Luly unit, the AVCOM unit, and a Sky Doc kit from Microwave Filter Company. The Sky Doc kit allows an installer to pinpoint the exact fix for various types and levels of TI by providing tunable (field adjustable) trapping of TI source signals with a calibrated absorption wave trap, as well as various bandpass and notch filters. The combination of

a calibrated spectrum analyzer and the Sky Doc kit is probably all a TVRO dealer would need for 99.9 percent of all TI situations he is likely to encounter.

1) Find South: It may seem very basic, but you start off by being certain that you know the headings to the satellites from your chosen field site. Many sites will have TI evident but the TI is at a weak enough level, and will be coming from a direction where the satellite antenna is pointing at the satellites. Abruzzo handled this with a simple, calibrated compass.

2) In checking for TI, the technique involves connecting a suitable antenna (the AVCOM TISH-40) to a suitable downconversion system. The horn antenna provides a measure of directivity, which allows you to determine, with a fair amount of accuracy, the general direction of any TI sources. The antenna also provides much needed signal gain at 4 GHz. The antenna couples energy into the mouth of either an LNA or a LNB where it is amplified. The combination of this antenna and the LNA or LNB is inadequate to receive the weaker (than TI) satellite signal levels but it is just about perfect for TI. If you can spot any TI signals with this antenna package, you know that it is going to be stronger than any satellite signals present.

3) The TI signals are amplified at 4 GHz and then either converted to a block IF in the LNB or externally converted with an accessory downconverter. Now they are ready to 'view' on an analyzer which functions within the frequency range of the block output of the LNB or the downconverter. In the case of the AVCOM PSA-35, you can couple directly from the LNA (at 4 GHz) into the spectrum analyzer since the PSA-35 has several input frequency ranges and one of these is the 3.7 to 4.2 GHz band.

Any signals received are displayed on the CRT of the analyzer. The signals will vary in amplitude (strength) as you rotate or move the horn antenna. You can see this display (level) change on the analyzer face as the antenna is moved and in short order you can 'peak up' the direction and measure the actual level of the TI signal(s).

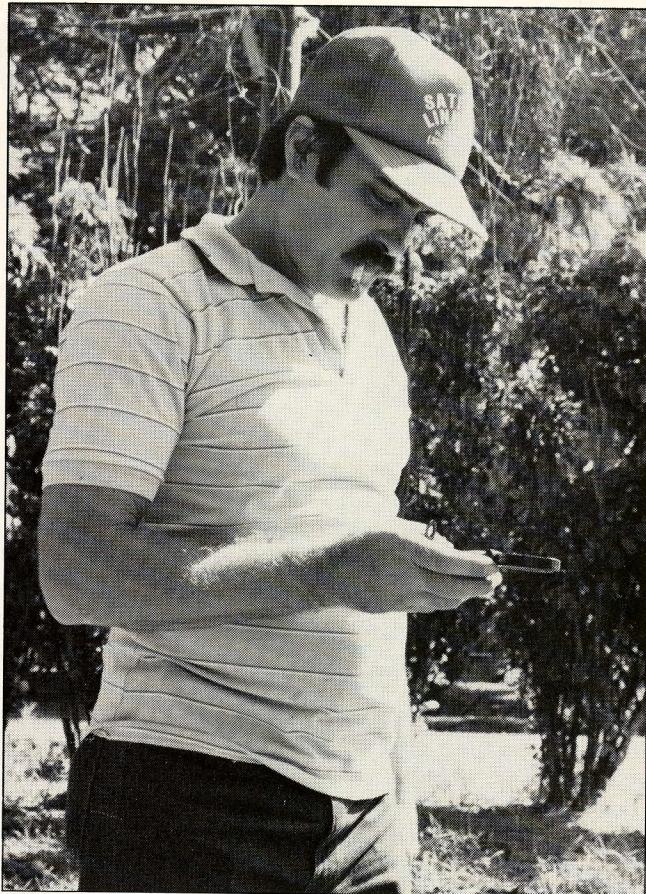
The Luly unit must have an LNB unit attached to the horn antenna since it has an input frequency range of 430-930 MHz (we were using a Janeil unit, manufactured by California Amplifier). The AVCOM unit covers the same 430-930 MHz range as well as the aforementioned 3.7 to 4.2 GHz range so we compared the performance of it at both ranges to see what difference (if any) there might be in actual use.

Neither unit (Luly nor AVCOM) contains built-in frequency

AVCOM HARD COVER

Protecting the face of an analyzer is difficult under field conditions. Not only is the CRT exposed to the elements but all of the switches and knobs are subject to accidental physical abuse, moisture and dust/dirt. The Luly unit provides a snap-on (leather) cover which when fastened into place will prevent damage under normal operating conditions.

Very recently, AVCOM has made a pliable, hard plastic shell-cover for the PSA-35 unit which snaps into place to protect the analyzer front faceplate when it is not in use (see photo). A rugged carrying case, designed as a custom cover for the AVCOM unit, with pocket storage areas for cables and connectors will be available by the time you read this report.



ABRUZZO checks for true south before the TI check begins.

calibration 'markers'. Some analyzers do have such markers built-in and when you have built-in markers, the display screen contains little 'pips' or vertical display marks which are reference points for calibrating the frequency of interference. If you are set up at a site where you have an operating TVRO antenna system, you can utilize the TVRO antenna and a satellite to establish your reference (frequency) points; a satellite with active transponders becomes a calibration system for you since the transponders are operating at known frequencies. In a pure TI checking situation with no operating TVRO antenna, you need to do a little mental work to determine the frequency





TUNING-IN TI/Alli Lake routes horn antenna reception through Sky Doc kit (right) and into PSA-35 analyzer to allow frequency-determination of TI carriers intercepted.

of the TI signals.

As a practical matter, numerous firms (including Microwave Filter) now provide dealers with 'Microwave Route Maps,' well done printed maps, pamphlets, and the like which tell you quickly which microwave routes and frequencies are licensed in your area. Since you are probably only working in a limited geographic area, and the microwave routes do not change abruptly within an area, after a few periods in the field you will know which frequencies are in use—and where. Once learned it is unlikely you will be bothered by any lack of specific knowledge in this area.

The Sky Doc kit from Microwave Filter, however, gives you another solution to calibration. The tunable absorption wave trap system provided as a part of this kit has a pair of tunable traps. The traps are frequency calibrated and here is how it works:

- 1) The antenna feeds the LNA and the LNA feeds the twin absorption wave traps. We are still in the 3.7 to 4.2 GHz range here.
- 2) The tunable traps now feed a downconverter if you are using a Luly analyzer, or they feed directly into the AVCOM PSA-35 in the 3.7 to 4.2 GHz range.
- 3) The analyzer displays the signals, and the TI sources stick out like tracer bullets in the dark.
- 4) By tuning the twin controls on the Sky Doc absorption



TI FOUND/In this case we were glad to find it! Luly analyzer proves its usefulness.

wave traps, you will see on the analyzer screen when the traps are tuned through the individual TI carriers. The carriers simply go down in amplitude or level as you tune the control through (across) their frequency. With the control(s) adjusted for maximum reduction of the TI carrier levels (simply seen by watching the amplitude display vary on the CRT), you read 'off' the frequency of the TI signal(s) on the calibrated knob of the Sky Dock trap.



AVCOM Winner

During the last Nashville trade show, AVCOM promoted their PSA-35 unit by offering dealers the opportunity to win one of the units. Thousands of entries were submitted in the drawing and while at least some people attempted to stuff the drawing box with multiple entries (the record was more than 60 entries from the same person; he did NOT win!) Jeff Cunningham of Sat-Tronics (2068 Scioto Trail, Portsmouth, Ohio 45662) was the eventual winner. Cunningham reports "The PSA-35 has been in daily use from the very day we received it!"

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COUNTING THE CARRIERS/Abruzzo (left) and Lake add up the unwanted TI carriers. They were all there.

Does it work?

Calibrating a knob on a 3.7 to 4.2 GHz absorption wave trap is no mean trick, in spite of the relatively stiff price (\$1200) for the Sky Doc kit. We are reading directly at 4 GHz (give or take a couple of hundred megahertz) here and that is pretty close to laboratory type measurements.

We found the particular Sky Doc kit provided by The Satellite Link to be useful, and even useable. But it is not a calibrated frequency meter and there will be a learning curve as well as a skill level which the technician or engineer employing the system will need to adapt to before he is totally proficient in this relatively new art.

Why do you need to know the frequency of the interfering carriers? You may not.

- 1) Once you know where the TI is coming from, the frequency of the TI, and the level (strength) of the TI, you can decide how you will cure it (or if it can be cured).
- 2) There are three general approaches to curing TI:
 - A) Shield the antenna or feed so the TI cannot get into the electronics of the system;
 - B) Install a 3.7 to 4.2 GHz frequency range trap or bandpass filter to knock down the TI signal before the LNA (or LNB) amplifies the unwanted TI signal;
 - C) Let the TI signal(s) into the system electronics,

but then try to trap those unwanted signals out at the receiver IF (intermediate frequency).

You only have to know the frequency of the TI if you have elected method B; a trap or bandpass filter system operating in the 3.7 to 4.2 GHz frequency range. If you are going to shield, or if you are going to trap at the receiver IF, the frequency of the interference is of no value to you.

By the same token, if you are working in an area where you are familiar with the TI sources (from route maps purchased from MFC or some other source), once you know and are familiar with the TI sources in your area, they won't change (without some warning) and you can simply refer to a table carried in a notebook.

Bulk Gain

The majority of the gain in the system, in searching for TI, is in the LNA or LNB. A horn antenna commonly has 22 to 25 dB of gain in this frequency range (larger horns are available but difficult to handle; bigger usually means more gain). The 40 to 60 dB of system gain provided by the LNA, LNB, or LNA plus downconverter becomes a significant part of the total gain when looking for TI.

With a 25 dB gain horn, you are at least 10 dB lower in gain or below what you would expect to be with say a 6 foot region dish. The horn is far easier to man (or woman) handle than a six foot dish, of course, and what you are really looking for here are TI signals which exceed the expected signal levels one will find from an actual satellite at the same location. There is therefore no need to be hauling even a four (or six) foot dish around for TI checks unless you are in one of those rare situations where the TI is coming at your site from almost exactly the same antenna heading as the low to the ground most westerly satellite signals.

We found that we could detect TI signals at about the same relative levels with either:

- A) The Luly unit through a Janeil LNB operating in the 430-930 MHz IF range, or,
- B) The AVCOM unit through an LNB such as the Janeil unit and also operating in the 430-930 MHz range, or,
- C) The AVCOM unit operating directly at 3.7 to 4.2 GHz preceded by an LNA with a nominal 50 dB of gain.

However, the AVCOM unit does exhibit a considerably lower threshold or sensitivity floor but as a practical matter, when you are searching for TI that is that low in level, the TI will not be troublesome to the installation in most cases (the exception being when the TI and the satellite headings will nearly coincide).

So, for sensitivity, while there are numerical differences in favor of the AVCOM in this particular application, as a practical user matter most installers will not feel handicapped by the higher threshold of the Luly unit.

Quick Work

The first time you use an analyzer, either of the two discussed here, in a TI searching routine, you will be amazed at how simple TI resolution becomes. It works this way:

With the analyzer/LNA or LNB, horn antenna, and some patch cables, you are footloose and fancy free; free to prance



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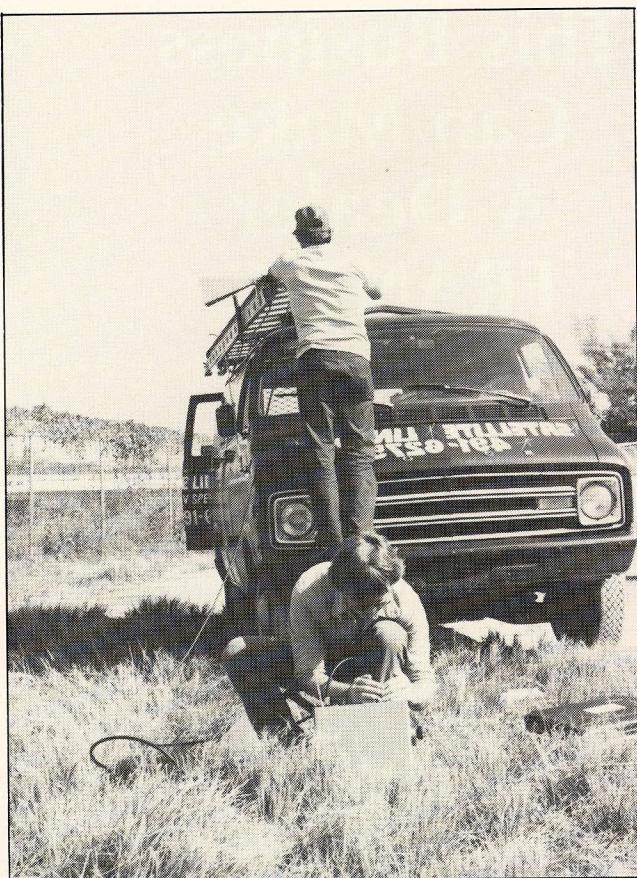
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ELEVATING THE HORN/ Abruzzo mounts the horn on top of the service truck to increase the TI signal as a 'worst-case' check on the potential TI problem at the chosen location.

about the yard of the customer to search out areas where the TI is reduced or non-existent. In about the same time it will take you to walk through the yard, in some sort of intelligent cover every inch pattern, you will quickly see on the analyzer CRT where the TI source(s) have dead zones. Terrestrial microwave sources, unless they originate very close in to your measurement site, will have big nulls and valleys (as well as some peaks) in the yard or on the property. Trees, buildings, hills—and other natural blockage (perhaps a mile or two away; not always in the yard in question and not always visible to you as you walk about) will create TI dead zones several feet or tens of feet across. If only trees and buildings close by caused blockage, after some experience you could sense where these spots are without the help of test equipment. However, the blockage is apt to originate some distance away and if you can't see these blockage points, you simply will not know how they interact to create a TI dead zone for you in the measurement backyard.

The CRT display of the analyzer becomes your eyes and ears, and as you walk and point the antenna, the CRT displays where those null points exist, and that, of course, is where you would hope to plant your TVRO antenna.

Reference Work

Checking for TI before an installation, with a portable rig built around an analyzer, is a relatively new art form in TVRO.

More often, the dealer finds he has some form of TI after an installation and must then figure out how to solve it. The popular trade press are filled with warnings to consumers: "Have your dealer guarantee you there will be no TI!" The only way the dealer can do this, of course, is to check for TI before he begins the installation.

The most common first-order fix approach for an installation that has TI is to attempt trapping out the interfering carriers with IF traps, or filters. The analyzer will help here since it can function at the IF range.

IF range filters work in this manner:

- A) TI signals, being originally at 3.7 to 4.2 GHz, are downconverted right along with the desired satellite signals. Fortunately, the TI signals are offset by + or - 10 MHz from the normal channel centers of satellites
- B) Thus when you are tuned to say transponder 22 and you have TI, the TI signals will be transponder 22 + 10 MHz and transponder 22 - 10 MHz. In your TVRO receiver, this places the TI signals offset by a small but important amount from the desired video/audio signals.
- C) This frequency offset allows you to install a specialized trap or filter within the receiver. Such a trap is tuned to the frequency offset TI associated frequency(ies) or such a filter reduces the bandpass of the receiver (IF) so that it just misses passing the TI signals.

The beauty of traps (Pico, Phantom, MFC, et al) or bandpass filters (ESP, et al) is that one trap or a pair of traps, or one filter, installed within the receiver's IF system will reduce or eliminate TI on all transponders. There is one box or gadget to install, with or without a switch, so the TI elimination unit can go into or out of the line at will, and is a relatively minor one-time expense to the customer. The alternative, trapping at 3.7 to 4.2 GHz, can be a checkbook buster. Prices in the \$1,000 to \$2,000 range are not unheard of. The 3.7/4.2 GHz traps cost an arm and a leg because they are highly precision handmade, and hand tuned, constructed from unique materials. They are also physically large, difficult to mount or hide, and subject to de-tuning when temperatures change.

Through these 'TI Mine Fields' the analyzer, virtually any analyzer, is a roadmap to a successful installation. But there is a consideration regarding the IF type traps or filters which you might elect to employ in a system. The frequency range of the spectrum analyzer.

IF or intermediate frequency ranges range from the old standard of 70 MHz (and many Ramsey/Sat-Tec units use 55 MHz) to some of the newer units which have demodulating IFs in the 500 MHz region (Panasonic, new DX, et al). The tuned traps or bandpass filters which install within the IF line portion of the receivers must first of all be selected, based upon compatibility between the IF frequency range(s) and the trap or filter device. A 70 MHz ESP-30 unit will not help (or work) on a 134 MHz receiver.

The analyzer must read out amplitude and frequency in the correct frequency range if you are going to use it after trapping or filtering to measure how effective that trapping might be.

The Luly analyzer covers the 430-930 MHz band. Yes, with an LNB ahead of it, you can also read the 3.7 to 4.2 GHz band. But nothing inexpensively available will allow you to read the 70 or 134 (etc.) lower IF ranges. In a nutshell, if making before and after measurements in a TI environment of the actual effectiveness of IF traps or filters is part of what you want to do, the AVCOM unit will be your choice (from the two being discussed here). Yes, it handles the full frequency range down to approximately 10 MHz.

Wireless Remote Set-Ups

UHF wireless remote control systems that grant the consumer extended control over his or her satellite receiver and actuator have become very popular. But to the installing dealer they present new problems of a sort. Field set up.

UHF remotes typically operate as unlicensed, FCC approved, (we shall assume) very low power transmitters in the 500 MHz region. Typically, the handheld remote arrives from the factory set up on the same frequency as the stationary controller box and electronics. This is of course necessary if the remote is going to talk to the controller. The frequency chosen by the factory may not always be an operational frequency which you can use; you may have local UHF television stations in the same frequency range, or high(er) power UHF two-way radio (repeaters) or other RF pollution in the area. Experience with early UHF radio controlled remotes tells us that if the flea powered, handheld transmitter attempts to communicate with the controller in the presence of a strong(er) RF field from another nearby UHF transmitter, the intense RF field from the more powerful UHF transmitter will swamp the receiver in the controller. This will drown out the handheld control signals.

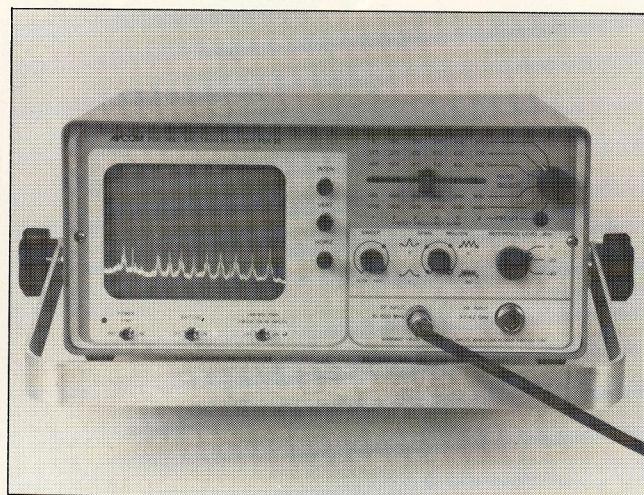
An analyzer to the rescue.

1) First, the dealer needs to verify what is causing the intermittent or short range condition of the handheld and controller combination. The analyzer will spot and verify that the handheld is putting out signal of sufficient strength more or less where it should be doing so, in the spectrum.

2) Second, the dealer needs to analyze whether the flea powered output from the UHF handheld remote is operating in a frequency area also occupied by other UHF signals. Television broadcast signals are easy to spot and you probably won't need an analyzer to see them, although correlating the exact operating frequency of the handheld remote/controller package and the frequency of the UHF TV transmitter will be far easier, quicker, and more accurate with an analyzer.

3) Third, it is possible to move the frequency of the handheld remote and also move the receiving frequency of the controller unit (the two have to move together, in the same direction, by the same amount to keep the controller receiving on the frequency the handheld is using for transmission). Chances are slim that you will accomplish this last fix with anything less than a spectrum analyzer since you need to find a clear spot to move to, and then slide the handheld transmitter frequency (an internal oscillator adjustment) to that region. Followed, of course, by sliding the receiver unit in the controller to the same frequency.

Both the Luly and the AVCOM cover the appropriate 500 MHz frequency regions although there is a sub-challenge with both—something called spurs.



WITH the AVCOM PSA-35 checking out a region handheld system means simply hanging an 'antenna' on the appropriate input fitting on the analyzer, place the handheld close to the antenna, and key up the handheld unit.

Remember that an analyzer is a receiver which replaces the normal video (or audio) output with an on-screen display. In the case of the AVCOM unit, which covers a multitude of frequency ranges between 10 MHz and 4.2 GHz, you have a quite complex internal oscillator system functioning. The oscillator system is part of the frequency conversion and display system internal to the analyzer. The Luly unit, covering only a single frequency range (430-930 MHz) has but a single oscillator system internally.

Our tests found something called 'spurs' or unwanted internally generated signals within the AVCOM unit which unfortunately fall around the 500 MHz segment which is of particular interest to those who would use the analyzer to set up handheld remote control systems. AVCOM is (now) aware of this conflict and steps have been taken to cure the problem.

Here was an application where we found the superior threshold or sensitivity floor of the AVCOM PSA-35 had a decided advantage over the Luly unit. To check out a 500 MHz region handheld system, you simply hang an antenna (such as a clip lead or small 9 inch whip) on the appropriate input fitting on the analyzer. Then you place the handheld close to the analyzer/whip antenna combo and key up (operate) the handheld unit. The display immediately reacts with a pip indicating the presence (and relative frequency) of the handheld signal. We found the AVCOM, in the more sensitive (switch selected) positions would detect and display the handheld signal when the Luly unit would not.

As a practical matter, you simply move the handheld closer to the Luly, thereby granting the analyzer additional signal so that its sensitivity floor is not taxed by the flea powered radiation from the handheld unit.

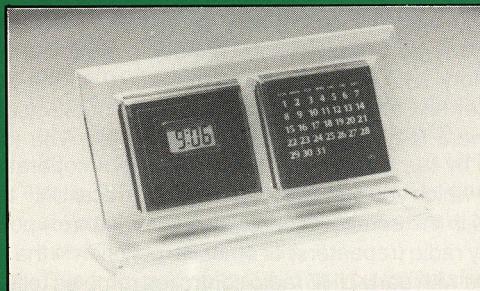
Next Month

...CSD will conclude our multiple-part look at the Luly and AVCOM spectrum analyzers and investigate how the installer uses these instruments to evaluate system component parts.

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Dealer Business Plan

Part II

by Michael J. Fennel



LEGALLY, the corporation has a life and identity of its own.

Corporations

A corporation is a legal entity which is treated for most purposes as if it were a person. It has a life and identity separate and distinct from that of its owners and operators. It may do most of the things a person or partnership can do. It can own property, including the stock of another corporation. The owners or shareholders of a corporation may be persons, partnerships, corporations, or any combination thereof. A shareholder has no fiduciary duty to the corporation unless he also happens to be an officer, director, employee or controlling shareholder. If such a person abuses his power or his office, uses the business as his personal business or under-capitalizes the company, he may lose the protection of limited personal liability which is one of the main reasons for the existence of corporations. Creditors may be able to 'pierce the corporate veil' and hold him personally liable for the corporation's liabilities. Also, the stockholders may proceed against officers of the corporation who have breached their fiduciary duties to the company and thereby recover any damages the company has suffered by reason of the breach.

A corporation is not difficult to establish but requires more stringent recordkeeping and more formalities and filings are required to sustain it within the law. In most states, a fee must be paid when the articles of incorporation are filed with the Secretary of State, along with initial license fees which must be paid whenever capital is paid in or when paid-in surplus or stated capital are increased. A franchise tax must be paid every year and an annual report must be filed with the Secretary of State. Many banks charge higher fees for checking accounts opened by corporations than for other types of accounts. A corporation may be organized in a state other than the state in which its primary business operations are located. This is generally done to take advantage of the tax structure of those states which actively encourage such incorporation. If you do so, you may be required to obtain a certificate of authority from the Secretary of State to carry on business in your state of residence and you could also be required to pay additional license fees and franchise taxes.

A corporation can be perpetual in duration. Ownership of the corporation can be transferred by sale, inheritance, gift or

otherwise. The perpetual life of a corporation can be a boon or a disadvantage, depending on the position of the shareholder. A large publicly held corporation needs the long life to carry out large projects which require lengthy preparation and planning. Yet, in a small closely held corporation, a minority shareholder may find himself locked into a losing proposition if the most able manager has died and the shareholder cannot force the dissolution of the corporation or find a buyer for his shares. The corporation is an efficient management form for a perpetual business. The shareholders elect a board of directors which, in its turn, elects or appoints the officers who carry out day-to-day business. This structure allows the corporation continuity of business philosophy combined with streamlined operation. The cost of this is increased complexity in the form of operation and the additional filings required of a corporation. There are also operational recordkeeping requirements to be met. For instance, the board of directors must obtain approval from the shareholders for certain acts outside the normal course of business. The board itself must act on matters involving the transfer or purchase of real estate and other matters outside the normal course of business. Annual reports, reports of issuance of shares, franchise taxes and reports of taxes in other states in which it does business also require action by the board.

S Corporations

Under the Subchapter-S Revision Act of 1982 and legislation controlling tax rates and qualified pension plans, as long as the corporation has no more than 35 individual shareholders, and has no nonresident alien shareholders, it can elect to be a Subchapter-S Corporation if all of the shareholders consent. For tax purposes, the S-Corporation will be treated like a partnership. Income losses, deductions, and credits are passed through directly to the shareholders with no double taxation. The S-Corporation status is particularly desirable because the early years of a small corporation may be unprofitable due to the extensive development the business requires before turning a profit. Under the Subchapter-S election, those losses can be passed through directly to the owners personal taxes, resulting in tax savings during the first years. It is important to file with the IRS an election form. For your right to be treated as a Subchapter-S-Corporation depends upon timely filing of that document.

Close Corporations

Small closely held, or close corporations are those companies which are not traded on the stock exchange and which have a small number of shareholders. Generally a corporation with fewer than 35 shareholders who meet certain criteria and who are all individuals may form such a corporation and maintain it through strict compliance of the detailed requirements for a close corporation under the state's statutes. The status can easily be lost, but while it remains, it gives some protection to the minority shareholders. The rules require that any restrictions on the transfer of shares must be set forth in a manner designed to protect the potential purchaser.

Foreign Corporations

A corporation which has been incorporated in a state other than that in which it is doing business is considered a foreign



CLOSE CORPORATIONS offer a measure of protection to minority shareholders.

corporation. The main reason for setting a business up in this manner is to take advantage of the favorable tax laws of the state of incorporation. You should consult with your attorney and accountant to determine whether your tax situation justifies looking into this form of business.

Professional Corporations

If you are forming an engineering, architectural or other professional type of service corporation, you should determine whether your state has any special restrictions upon the incorporation of such a business and determine what, if any special regulations need be followed in the information and operation of such a business.

Incorporation

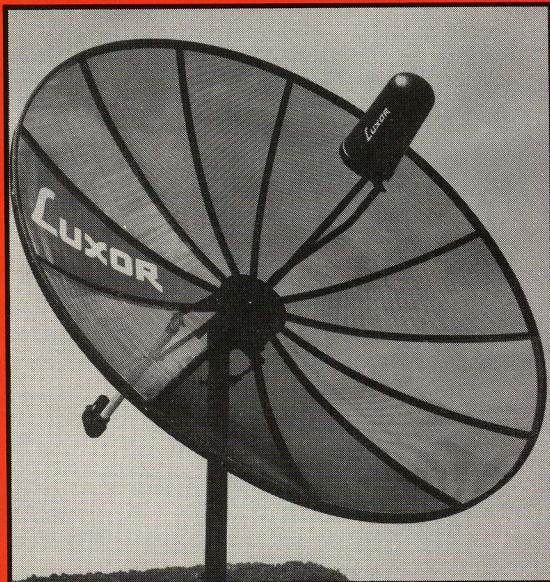
Prior to incorporation, it is wise to enter into a stock subscription and a pre-incorporation agreement between all the potential shareholders and incorporators. In order to prepare this document for you, your attorney will require certain information.

- 1) The name of the corporation and any alternative names that would be acceptable if the first choice is taken and any assumed name.
- 2) The name, address, and phone number of the initial registered agent and his business office address.
- 3) The duration of the life of the corporation stated in years or perpetual.
- 4) The statement of all the purposes for which the corporation is being formed.
- 5) The classes of stock to be issued.
- 6) The number of shares authorized in each class.
- 7) The Par Value. You can select a no par value stock. If nothing else, it will save fees which are based on the stated value of the stock.
- 8) The amount of capital to be paid in.
- 9) The number of directors to be elected at the first meeting of shareholders and the terms of office and compensation.
- 10) The location and value of all property to be owned by the corporation during the following year. The estimated gross

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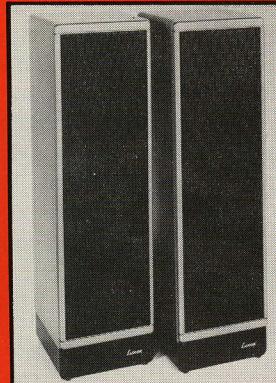
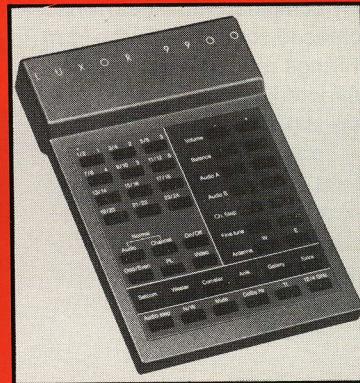
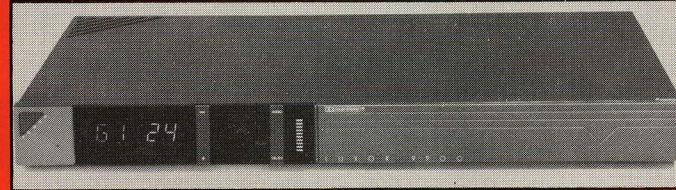
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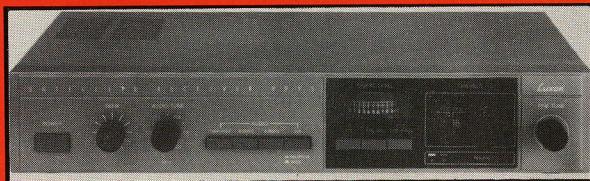
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amount of business which will be transacted in each state during the first year.

- 11) The location of the corporate offices.
- 12) The name and address of depository banks.

If you provide this information, your attorney will ask you any further questions which he deems necessary for the preparation of the agreement and the articles of incorporation.

CORPORATE ANNUAL REPORT

Each year an annual report must be filed with the Secretary of State. Your attorney should enter the due date in his diary and you should do the same to ensure that the information needed is prepared in a timely manner. Your attorney should have all of the information he needs by the end of the first year to file the report for you. Such a report must be filed whenever additional shares are issued and stated capital or paid-in surplus are increased or when an assumed name is adopted, changed, or renewed. Written records must be kept of numerous corporate activities with the forms of business being strictly defined by state statute. Your attorney can make certain that such matters are properly completed.

CORPORATION CHECKLIST

- 1) Articles of incorporation
- 2) Subchapter-S election
- 3) Close corporation election
- 4) Corporate tax returns
- 5) Annual report
- 6) Knowledge of VCC, Ch. 2
- 7) Report of issuance of share, stated capital or paid in surplus
- 8) Directors meetings, consents, resolutions, calls and notices
- 9) Shareholders meeting
- 10) Certificate of adoption of resolution
- 11) Plus all of the matters covered in the sole proprietorship checklist.

CORPORATE CHART

LEGAL IDENTITY: A separate entity, it sues, is sued and owns property.

DURATION: Per state law or charter, it can be perpetual.

LIABILITY: Shareholder liability is limited to money invested. Statute may allow further liability.

OWNERSHIP: Shares are freely transferrable within the securities regulations. Close corporations have limited transferability. Dividends run with the shares.

CAPITAL: No personal liability for loans. Corporation has separate life and credit, stock may be used as collateral.

BUSINESS DECISIONS: Board controls by majority vote. Close corporation may require unanimous action by agreement, based on state law requirements.

MANAGEMENT: Shareholders need not share in management to share in profits.

CONSTRAINTS: Corporation is controlled by state statute and by its charter. Inflexible management procedure.

INCOME TAX AND PROFIT DISTRIBUTION: A separate taxable entity, the corporation pays taxes. Both corporation and employee pay social security. Shareholder pays on compen-

sation. Subchapter-S corporations can elect to be treated as a partnership.

RETIREMENT: Benefits and contributions are based on size rather than the type of company.

CHARITY: Corporate contributions are limited by federal tax law.

LIQUIDATION: Shareholders may have a taxable gain at time of liquidation.

PARTNERSHIP CHART

STRUCTURE: The individual is generally responsible for activities of the partnership.

TERM: Stated time, term or death of partner unless otherwise agreed.

LIABILITY: General partners are fully liable. Limited partner's liability limited to investment.

OWNERSHIP: Transfer terminates partnership unless agreement says otherwise. Limited Partner may sell with consent of all partners.

CAPITAL: Capital from partners or loans guaranteed by partners. Partners are individually liable for separate audit. Partnership assets cannot be pledged.

BUSINESS DECISIONS: Majority rule.

MANAGEMENT: All general partners are involved in management. Limited partners can't be.

CONSTRAINTS: Actions are controlled by partnership agreement.

INCOME TAX AND PROFIT DISTRIBUTION: Not taxed. Individual partner pays taxes on his share of profit, whether it is distributed or not.

RETIREMENT: Limited to HR10 type plans plus your individual plans. See accountant or attorney.

CHARITY: Partnership contributions are divided among the partners and each individual partner deducts a pro rata share on his own income tax return.

LIQUIDATION: Distribution of assets normally doesn't result in a gain to the partners.

SOLE PROPRIETORSHIP CHART

STRUCTURE: The owner has the sole responsibility for the business.

DURATION: Lives and dies with you unless special arrangements have been made.

LIABILITY: Full personal liability.

OWNERSHIP: Full ownership. If you sell it, it's gone.

CAPITAL: Your business, your credit, your liability.

BUSINESS DECISION: You decide.

MANAGEMENT: You manage or delegate to employees.

CONSTRAINTS: Free as a bird.

INCOME TAX AND PROFIT DISTRIBUTION: Your income, your taxes, you pay self-employment taxes.

RETIREMENT: Keogh, IRA, Social Security.

CHARITY: Personal deductions.

LIQUIDATION: Upon transfer of interest or death of proprietor.

INSURANCE

Like taxes, insurance considerations are very important for the continued health of your business. It is important to prepare for accidents, errors and omissions which could result in substantial unanticipated liabilities.

We will begin with a familiar type of insurance, the Au-

tomobile Liability Policy. The automobile policy language will set forth the following items of the insurance agreement: The contract of insurance, which is a detailed promise of the insurance company to cover your vehicle; a definition of who is being insured and what vehicles are being insured; and any exclusions from coverage and conditions of the policy.

The policy is the contract for insurance. The declarations or 'dec. sheet' will be attached to your policy. This sheet generally states which coverages have been issued under the policy and the premium paid for each coverage. This sheet also identifies the policyholder, the named insured, and vehicles which are covered, the policy term and limits of liability. Together these writings constitute the policy or contract for insurance coverage.

You should purchase uninsured and underinsured motorist coverage. This coverage is inexpensive and protects you and the occupants of your vehicle if involved in a collision with a vehicle whose owner and operator is not sufficiently covered by insurance. The minimum limits of liability which the insurance carrier must offer for this type of coverage are set forth in your state insurance codes. Most companies will sell higher coverages than the required minimum. I would suggest that you purchase coverages at least equal to your liability coverages.

Comprehensive General Liability Insurance Policies

This policy insures a business against liability for accidents, including products liability coverage and general tort coverage. Automobile liability and workmen's compensation coverage must be covered under separate insurance policies. Read the definitions and exclusions of your policy very carefully, for it is these sections which define who and what is covered or not covered under the policy. The type of policy should be drafted in such a way that it affords you coverage for personal injury, which may include such diverse occurrences as bodily injury, false arrest, libel, or wrongful entry. It should also provide coverage for property damage, which includes damage to tangible personal property.

Be sure to include yourself personally and your landlord, particularly if you are the landlord, as Named Insured. Handle all insurance purchases by letter. Insurance agents are human too, and errors can occur. If you have any question whether your policy covers the types of occurrence which should be covered, have your policy reviewed by your attorney and make certain that he fully understands the nature and extent of your business pursuits.

Set up a claims handling procedure and don't ignore notices of claims or service of summons. To do so could result in personal liability for a judgement. Records and management for potential liability and litigation must be considered and a recordkeeping method established. You should make conscious decisions about your method of record retention and retrieval. This will be the living history of your business decisions and activities. Give your lawyer a chance to win future cases by preserving the important documents pertinent to each project. It is wise to get some legal advice as to the type of records to retain, how long to retain them and where to keep them.

Coverage for liability resulting from explosion, collapse or

underground property damage are generally excluded from the comprehensive general liability policy unless the damage results from work performed by an independent contractor for the insured or the property damage is of a type that is included within the completed operations hazard coverage or the liability for the damage was adopted by the insured under an incidental contract. If in doubt as to your coverage, consult your insurance agent and your attorney to be certain that you are covered for the type of risks inherent in the operations in which you are involved.

Product Liability And Completed Operations Coverage

Anyone who sells a product can be liable for defects in that product even if he was not negligent, due to a theory of 'strict liability' for any product that is placed in the stream of commerce. The only way to protect yourself is to carry product insurance. Since 1966, these coverages are generally included in the standard Comprehensive General Liability policies. Product liability coverage insures against bodily injury and property damage resulting from the use of the product, after being sold, where a breach of warranty or a defect allegedly occurred. The defense of product liability litigation is a complex and expensive activity, the cost of which should be underwritten by your insurer.

Completed Operations Coverage insures against injuries or property damage resulting from your operations or from a breach of a warranty or representation where the damages occurred after you have completed your work. If you are an officer or director of a corporation, you should also consider obtaining insurance to cover errors or omissions in the course of your duties.

Health, Life, And Disability

These coverages are probably sufficiently familiar concepts which do not require extensive discussion here. If there are key personnel in the business who would be difficult or expensive to replace in the event of death, protracted illness or other disability, insurance should be carried on that person or persons to compensate for the loss of his services to the business and to provide for the money needed to carry on in his or her absence. This type of insurance may be deductible as a legitimate business cost. You may wish to consider officers and directors insurance if you have incorporated. Health insurance is generally not deductible unless it is a qualified group health plan of a corporation.

Insurance Checklist

- 1) Comprehensive General Liability Insurance Policy
- 2) Product Liability and Completed Operations Policy
- 3) Automobile Liability, Medical Pay, Uninsured and Underinsured Motorist Coverage.
- 4) Workman's Compensation Insurance
- 5) Unemployment Insurance
- 6) Officer's and Director's Insurance
- 7) Other Insurance: Plate Glass, Board-Up Service, etc.

Taxes

Tax planning is very important. The biggest single slice of profit a business can make comes from tax reductions result-

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TAX planning ensures that legal deductions are not overlooked.

ing from intelligent tax planning. The tax dollars you protect are the easiest dollars you can earn. However, tax planning is such a complex matter that you should discuss the tax aspects of your business very thoroughly with your accountant and attorney before you decide in what form to organize your business. Tax planning is not a proper subject for such a short summary as this. We can only caution you to have your advisors prepare a method for keeping track of all of your deductible expenses in such a way that you do not lose the benefit of the deductions and credits to which you are entitled under the code.

Shareholders and officers can lease equipment to the corporation and take the depreciation on the equipment. Doing this also takes money out of the corporation without double taxation.

Taxes Checklist

- 1) Federal Income Tax
- 2) State Income Tax
- 3) Bulk Sales Tax
- 4) Use Taxes
- 5) Service Occupation Taxes
- 6) Service Use Tax
- 7) Motor Fuel Tax
- 8) Gas Revenue Tax
- 9) FICA
- 10) Self-Employment Tax
- 11) Retail Sales Taxes—you must apply for and obtain a registration number and perhaps post a bond to ensure payment of the retail sales tax
- 12) Federal Employers Identification Number (FEIN)
- 13) SS-4 Checklist and other forms
- 14) Corporate Annual Report checklist
- 15) Application to adopt or change assumed name

Professional Licenses And Fees

You will want to obtain any professional or contractor's licenses required by the state and municipalities in which you perform installation services. Contractor's licenses in most municipalities can be had for the payment of a licensing fee in the amount of \$20 to \$100 and an application. The procedures are so varied and esoteric that there is no substitute for visiting the village clerk or having your attorney obtain it for you. It would be a good procedure to obtain a copy of the local municipal building code and to pay particular attention to the section relating to antennas.

Many villages have drafted or are considering the passage of restrictive ordinances which treat satellite TV dishes quite differently from TV antennas or Ham radio towers. These regulations vary from an outright ban on residential satellite TV antennas to no regulation at all. Often you will find that any dish below a certain threshold size, generally four to six foot region, can be installed with a simple permit. Dishes above that size range may be the subject of zoning restrictions and require published notice, a substantial application fee and a full zoning variance hearing. You will have to become familiar with the rules and with the people who administer them in your area if you are to be an efficient dealer. In addition, your state may require an installer's license, which could require you to pass a course and a written examination. Indiana has adopted such a system. Because the industry is changing rapidly, the law is in a state of flux and you must check the latest developments in your area before acting.

The following is a checklist of the type of information you will need to obtain the authorization to install an earth station in a fairly restrictive environment:

Licenses Checklist

- 1) Contractors Licenses
- 2) Building permits
- 3) Zoning ordinance variance
- 4) Obtain a Plat of Survey of property on which the system will be erected.
- 5) Add to the Plat of Survey engineering drawings of the precise location of the anticipated installation.
- 6) Prepare a list of the facts required in the application.
- 7) A good lawyer can help you through the red tape. The more you know the more you can control your costs and his effectiveness, but do what you do best and delegate the rest. If the majority of your income comes from sales, concentrate on sales and leave the installation, service, troubleshooting, accounting and, yes, legal beagle work to specialists who can do it more efficiently than you can. Their services are deductible and you will make more money by specializing in the high profit end of your business.

Conclusion

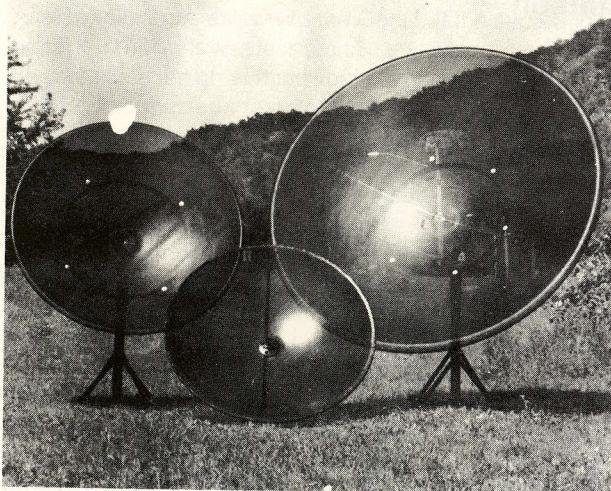
As we have emphasized from the beginning, this is only a beginning point for your studies. Continue to read the original sources of the rules and regulations governing the business you have begun. You may never know all there is to know, but the more you know and apply the better your chances of success.



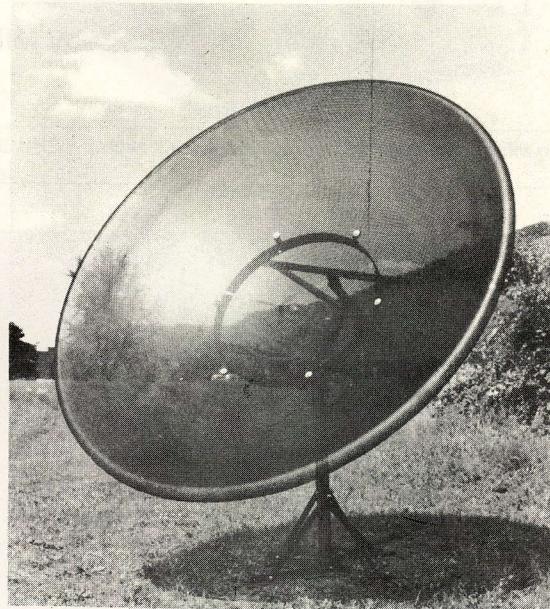
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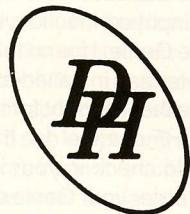
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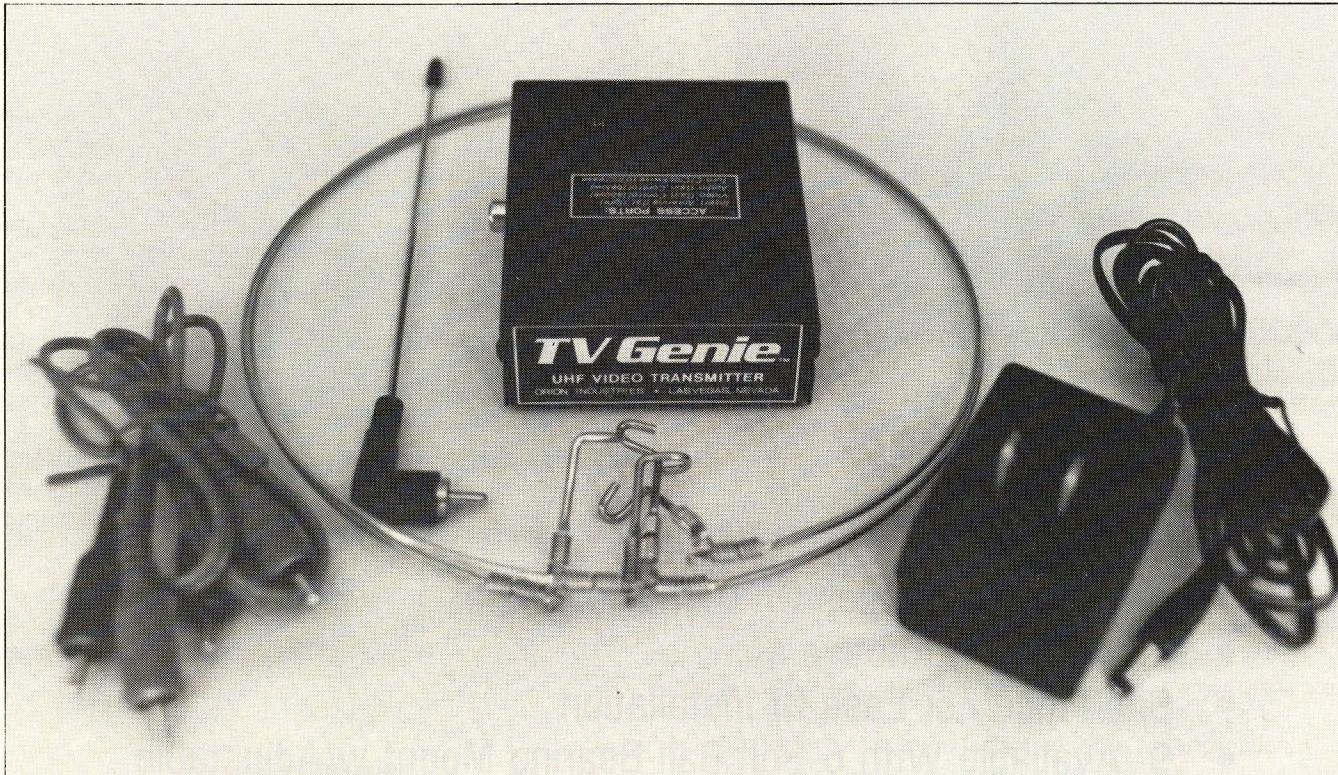
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TV Genie

by Mike L. Gustafson



THE GENIE comes complete with three UHF antennas, a phono patch cord, an external power supply, and a whip antenna.

The TV Genie, sold by Orion Industries located in Las Vegas, Nevada, is a miniature TV station. Designed to operate on UHF TV channels 14, 19, 23, 25, or 27, it can transmit an audio and video source such as a VCR, computer game, or satellite signal across the room or all around the house. The Genie can operate off a 110 volt AC power supply, which is provided, or an internal 9 volt DC battery.

The Genie, at a cost of \$69.50, comes with three UHF TV antennas, a phono patch cord, and external power supply, and a whip antenna. The transmitter is very simple to use as it has only two signal inputs, a power supply connection, antenna jack, and on/off switch. The video and audio from your satellite receiver or VCR is connected to the Genie with the phono

patch cable. Next, the power supply is plugged into the wall socket and then into the Genie. The whip antenna is then attached to the side of the Genie and the power switch is turned on. If your TV set does not have a UHF antenna installed on the antenna input connection, attach one of the antennas provided with the Genie. I found that all of my TV sets still had their UHF loop antennas installed and ready to go.

The Genie that I bought for this review was channeled up to operate on UHF channel 14. If you are interested in this product you should check in your local area for commercial UHF stations and order your Genie on a clear, unused channel. I installed my Genie on my main satellite system, tapping into the audio and video outputs on my receiver. I went upstairs and

tried to tune in the retransmitted satellite signal on my portable TV set in my bedroom. I could see the satellite signal on the TV set, but it was not very clear or sharp. I tried fine tuning the TV channel and messed around with the UHF antenna, but I could not get a usable picture.

The Genie is supposed to be able to transmit a signal for 200 feet, based on data found in the operating manual. My bedroom is no more than 50 feet from the main satellite system where the Genie was located. I next set the Genie up on my lab bench and went around the house trying all of the TV sets and what I found was that 50 feet was really the absolute outside limit on usability with the Genie. If the separation between the two units was less than 50 feet, the picture on the TV set was okay, not great mind you, but okay.

Next, I connected the output of the Genie to my spectrum analyzer to get some feel about how clean the output was. I had heard some user comments about the Genie causing interference to block downconversion satellite receivers. What I found was that yes, in fact, the Genie has quite a few output frequencies other than channel 14. I also noticed that the channel 14 output was not even correct for channel 14. That is, the Genie transmitter was not a true amplitude modulated vestigial sideband transmitter. I am not going to go into what all that means, but if you look at the photo of the spectrum you will see an audio sideband above and below the main video carrier. Only the sidebands above the video carrier should be there, the two lower sidebands should not be present. In the case of the channel 14 transmitter, the extra sidebands are not a major problem, but if you tried to operate this transmitter on a higher channel, the unwanted sidebands could cause a problem to the lower channel. The Genie also had output carriers on so many different frequencies that all block downconversion intermediate frequency schemes could have a problem if the Genie was operated in close proximity to the satellite receiver.

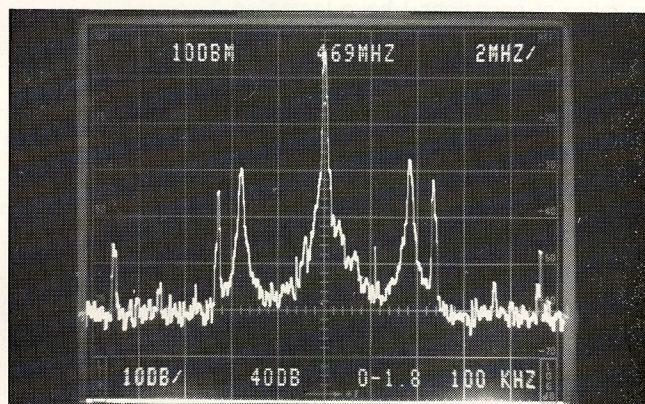
Some of the unwanted output frequencies also fell into other police, fire, and aircraft communications channels. In all cases the output power of the Genie was less than 10 milliwatts; if you were located in exactly the wrong place, you could cause a problem to some other communications service. To be fair, in most situations, the Genie probably would not cause any problems to other services or agencies.

At this point I became concerned about the legality of the TV Genie, so I called the local office of the Federal Communications Commission and made some discrete inquiries about this type of product. Based on the FCC field engineer I spoke to, the TV Genie does require an FCC type acceptance or approval certificate before it can be sold. Also, depending on how much the transmitter is used, it may require an operating license. I then called the folks at Orion industries and they indicated that there were not any FCC certificates currently available for the Genie. Unfortunately, that makes the use of the TV Genie a violation of the federal communications law.

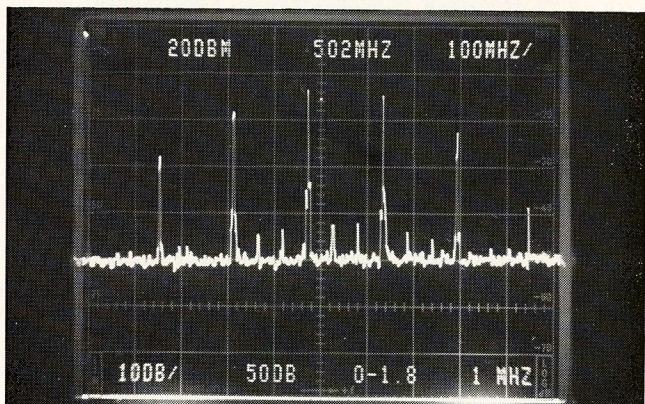
With the lack of FCC approval, the questionable license status and the large quantity of spurious unwanted outputs from the Genie, I would not like to see very many of these products out in general use. I therefore cannot recommend the TV Genie for your purchase or use until the legal status of the product is resolved. Based on my conversations with the FCC, it may well be impossible for the TV Genie ever to be made



THE UHF wireless TV transmitter can be held in the palm of your hand.



NOTE the two unwanted audio sidebands below the main video carrier.



THE GENIE has spurious output carriers on many different frequencies.

legal.

The product does do what it says it can do, and maybe this is another case where the technology has outrun the laws. I personally can see a real need for this type of product and if the output spectrum was cleaner I might be tempted to use one myself. However, as the product stands now, I would be afraid of a knock on the door from a man with a federal badge.

Antenna Drives

by Mike L. Gustafson

The youngest segment within the home satellite reception marketplace is the antenna drive or positioner industry. On a number of occasions I have lamented the sad state of the technology of this new industry-within-an-industry. In early March, I sent out 27 letters to all of the drive system manufacturers asking each to comment on what I thought were major design considerations facing antenna positioner manufacturers. After much arm twisting and many phone calls, I received a total of three responses from the drive industry. These responses are printed in the following pages and seem to be in general agreement as to the problems and solutions facing the drive community.

The general conclusions seem to be:

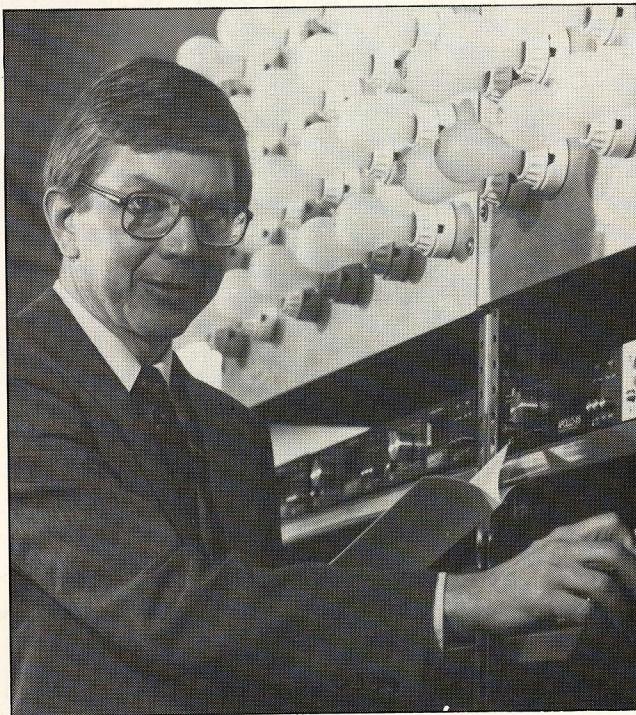
- 1) The best trouble-free sensor is a reed switch.
- 2) The use of mechanical limits is a first choice to limit actuator over-travel. Limit switches are the second choice, and electronic limits are the third choice.
- 3) Linear actuators were the first choice of all three companies, which is not surprising since none use any other kind of actuator. Horizon to horizon actuators were found to be a little weaker in design, but with recent developments, linear actuators could be in for a run for the money with horizon drives.
- 4) A lack of weatherproofing was the biggest cause of drive failure, due to water ingestion. The combination of rubber boots and seals with drain holes was the general solution to the problem. The use of water resistant grease was also recommended.
- 5) Drive system runaway was felt to be caused by improper installation, microprocessor lock up, and operator error. I think this bug-a-boo will always be with us with the use of computers in drives. Using mechanical limits and limit switches will at least save the antenna and drive from damage.

The drive industry is really only two years old and, as such, is still going through some growing pains. In just the last nine months I have seen significant improvement in most drive designs. By the time the 1986 selling season gets under way, even more reliable designs will be on the market. From the standpoint of the consumer trying to choose the best drive, either as a stand alone system or a fully integrated system, my best advice is to stay with companies that have been around the longest and therefore have already made their mistakes. This is not to suggest that a new fledgling drive company couldn't start out by taking advantage of the mistakes of those that have preceded them and produce a good product.

Choose your drive system carefully; read the three articles

appearing here, and consider each point before making your purchase. Based on the data found within each submission, and your own common sense, you should be ahead of the pack in selecting a drive that will operate with a minimum of problems and a maximum of ease.

I would like to thank each of the authors for taking time from their very busy schedules to contribute their articles.



Peter E. Kent, President of Kent Research Corporation.

Which Is Best?

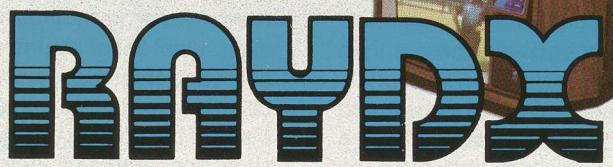
Common forms of feedback sensors are Hall effect (Hall), potentiometer (pot), magnetic reed switch (reed), and optical encoder (optical). A Hall effect sensor must have surge protection diodes on the sensor. Otherwise, it will burn out on a nearby lightning strike. Reed switches are inexpensive but they cannot operate at high switching speeds. Optical encoders are able to give the greatest resolution and accuracy but they are quite expensive. Pot sensors are analog sensors and, as such, are immune to power outages and miscounting elec-

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tronic noise pulses as count pulses.

By the time the engineers have designed each sensor to be equally reliable and accurate, I suspect that the reed switch will be the least expensive, followed by Hall effect, pot, and optical encoders. Given the motor drives being sold today, I could select examples which could make each type of feedback sensor appear poor or excellent.

Which Travel Limit — Mechanical Or Electrical?

Factory set mechanical limit switches seem to be the safest. However, if these switches have to be set or reset in the field, you start dealing with human factors that lower their reliability. Electronic limits which use a pot sensor and an analog controller are nearly as safe because they never lose their memory during power outages or miscount noise pulses. Electronic limits using Hall, reed, optical or digitized pot sensors could forget the current position count and the limit counts during a prolonged power outage. If these counts are lost, then the limit protection is lost.

Kent Research has sold thousands of systems using an analog pot and has received only 0.02% units returned with a bent tube. If the motor drive has a slip clutch then I feel the analog pot is as safe as the mechanical limit switches. If the motor drive does not have a slip clutch then I would suggest using a drive with mechanical limit switches.

Linear Actuators Or Horizon To Horizon Drives?

There is a trend in the industry towards horizon to horizon drives. In determining which type drive is best, you will probably want to look at which drive is cheaper, stronger, easier to install, and allows access to more satellites.

Horizon to horizon drives are not yet cheaper than linear actuators. Currently, both type drives seem equally difficult to install. A factory preassembled horizon to horizon drive might be easier to install.

Regarding access to more satellites, it is true that horizon to horizon drives scan a larger sector of the satellite belt. The US and Canada "own" from 70W to 140W degrees of this belt. This range can be covered easily with linear actuators. Other countries "own" other sectors. I think few people will want to view satellites in other country's sectors for the following reasons:

1) Satellites beam their signal towards the targeted countries. Thus, the European satellites' signal strength will be very weak in the eastern United States. Antennas which receive these signals will have to be much larger than antennas which receive the US satellites. Few people will want to pay the extra money for these larger antennas.

2) Even if the signals are received, European TV works on a 650 sweep lines per picture format. The US works on a 525 sweep lines per picture format. Ordinary US televisions will not be able to watch European television due to this difference.

3) Even if you have the proper TV, few people are fluent enough in several languages to be able to watch and understand a foreign program.

4) If there is a demand for foreign programs, there are plenty of unused US transponders. It would be cheaper if the foreign signals were picked up at a single US point, reformatted to 525 lines, dubbed or subtitled in English, and transmitted to a US

satellite for rebroadcast.

From a strength standpoint, the linear actuator wins easily over the horizon to horizon drive in both driving torque and holding force. Over 80% of the horizon to horizon drives I saw at the recent Tulsa show appeared to be much weaker than the linear actuator drive.

This is not to say that horizon to horizon drives cannot be made stronger, cheaper, and easier to install than the linear actuator. But until then I think the main appeal of the horizon to horizon drive is based on perceived benefit rather than actual benefit to the customer.

Weatherproofing

Even if the linear actuator could be made weatherproof, the warm, moist daytime air would condense inside the tube at night. I feel linear actuators should have drain holes pointing down and should use a non water soluble grease. Rubberized bellows over the movable end of the tube is a nice option. Many of the horizon to horizon drives I saw at the recent Tulsa show appeared as if they might have a problem dealing with the snow and ice in the winter.

Memory: How Much Is Needed?

Given that the United States and Canada own 70 degrees of a satellite belt, and if 2 degree spacing between satellites becomes a reality, then there is room for 36 satellites in the C-band. Assuming there are 24 transponders per satellite, this represents 864 potential channels of TV. I doubt there will ever be a need for this many channels or satellites.

We all find that having only five preset push buttons on our car radio is adequate for our needs, providing we can manually tune in the rest of the radio stations. I think most people will find that they rarely watch over five to ten satellites, regardless of the number eventually in orbit. In other words, I would not make a buying decision based on motor drive A having memory for 80 satellites versus motor drive B having memory for 60 satellites.

Other Desirable Features

For Convenience:

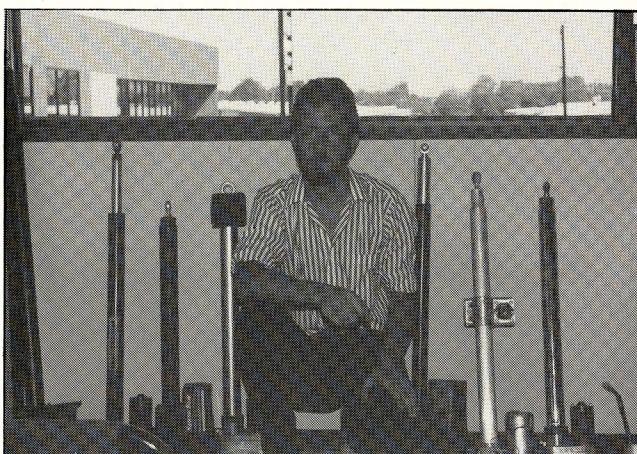
- Wireless remote control.
- Select satellites by their standard letter-digit code.
- Automatic skew adjustment for each satellite.
- Parental lock-out.

For Easy Installation:

- Simpler programming of all satellite and skew settings.
- Terminal strip for solderless installation.
- Setup switch to eliminate accidental reprogramming.

For Reliability:

- Digital noise filtering to eliminate counter resetting.
- Induced lightning & transient surge protection.
- Current limit to prevent motor burnout.
- Programmable travel limits.
- Gentle starts and stops of the motor for longer life and more accuracy.



Peter Cole, Director of Technical Operations at Houston Tracker Systems.

Houston Tracker Systems
Peter Cole, Director of
Technical Operations

Understanding Antenna Drive Systems

Because of the relative newness of satellite antenna positioning systems, there has been some confusion and controversy over drive system technology. A review of a few basic questions is necessary to aid in understanding this new technology.

I am often asked questions about sensors. Drive position performance is certainly affected by choice of sensor, and, in my opinion, a reed switch is the best choice for a feedback sensor for several reasons. A reed switch is not damaged nearly as easily as a Hall effect sensor when it is miswired by the installer, or when it is exposed to voltage spikes. Even a surge protected solid state device is most often more sensitive to damage than a reed switch. Also, a reed switch will not oscillate when corrosion gets on the wiring, whereas a Hall sensor is more vulnerable to the effects of corrosion. A reed sensor is less trouble than a potentiometer, too. A potentiometer must be synced to the type tube used, according to the number of threads and length of the tube. The extension tube must not rotate on the actuator before mounting. Furthermore, most potentiometers are not hermetically sealed, and this allows moisture to enter the sensor. On the other hand, the reed switch is a glass envelope similar to a light bulb. The glass is filled with an inert gas, and this glass capsule is surrounded by epoxy. The potentiometer presents other problems, too; if a 1 K ohm potentiometer is miswired upon initial installation, it is often blown. If a larger value pot is used, then the electronics in the actuator becomes sensitive to moisture, and this changes the position reading at the control box. Photo interruptors have the same problems that Hall sensors do, but with an additional disadvantage: they are also sensitive to dirt and light diffusing wear of the optical disk. In regards specifically to repeatability, any of these sensors can be used to reliably and consistently position the dish. However, performance of the sensor is ultimately dependent upon mechanical and electrical integrity of design—and also on correct assembly—of the entire dish positioner system.

When comparing electromechanical and electronic limits,

it should be kept in mind that electromechanical limits must be synced to the actuator, much like the potentiometer described above. Unfortunately, this causes problems in manufacturing, distribution, installation and service. If the piece of electronic gear is soundly designed and manufactured, however, and if false position information is not returned from the actuator, the possibility of dish runaway or limit over-running is extremely unlikely.

Dish runaway or memory loss can be broken down into three categories: Processor lock-up, dish mis-positioning, and operator error. Processor lock-up, which is caused by the processor executing erroneous data or instructions, can be caused by poor installation of electronic gear. If a unit is not plugged into a grounded outlet, then static and surge protection devices inside the unit are not able to protect the unit from static and voltage spikes. Processor lock-up can also be caused by poor electronic design. If a piece of equipment cannot tolerate a myriad of blackouts, brownouts, static discharges and voltage surges, it will not retain its memory over an extended period of time. The Houston Tracker System V will indicate if it has lost memory or if a processor lock-up has occurred; to my knowledge, this is a unique feature. It was designed to aid dealers. Dish mis-positioning can be the fault of the installer, the control box, or the actuator. If the installer doesn't follow the instructions of the manufacturer exactly, then the unit cannot be expected to perform properly. An example, shielded wire must be used to interconnect the actuator and the control box. If shielded wire is not used, the result is greater susceptibility to lightning, and mis-positioning will occur.

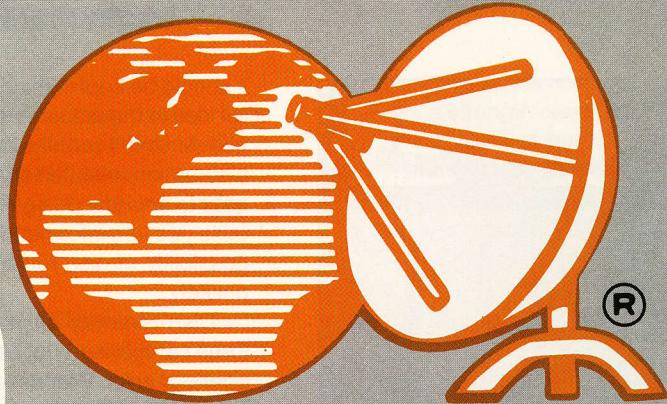
The control box can be at fault if the unit has not been designed to count the pulses properly or if it has a mechanical problem. The actuator can be at fault if it doesn't give the control box a true and accurate response as it moves. Operator error relates to the dealer's and consumer's use of the system. If a customer accidentally enters the wrong code or presses the wrong button, then, depending upon the control box's design, the unit can lose some or all of its programming. The Tracker System V has a customer mode and a set-up mode, and if the dealer properly sets up the system, then nothing that the customer does, within reason, can cause operator error.

Horizon to horizon actuator requirements are dependent upon the specific controller used. Houston Tracker Systems recommends the use of a 36 volt DC motor with a reed switch; this will produce approximately 1000 counts from horizon to horizon. We also recommend that manufacturers use the same coupling and shaft rotation as that of the Saginaw 18 inch motor; this has become a standard of many actuators.

Weatherproofing is another important consideration, and the answer to weatherproofing lies in actuator design. As linear actuators extend and retract, they pull air in and force air out of their interiors; if water or moist air are pulled inside, then drainage must be available to eliminate corrosion or freezing problems. An actuator must be designed with this in mind. Weather seals help, as do accordian boots, but no matter which weatherproofing aids are used, the actuator must be able to breathe.

Houston Tracker Systems believes that a good antenna drive system is the most important part of a complete satellite system, and that a more logical approach to understanding the

10



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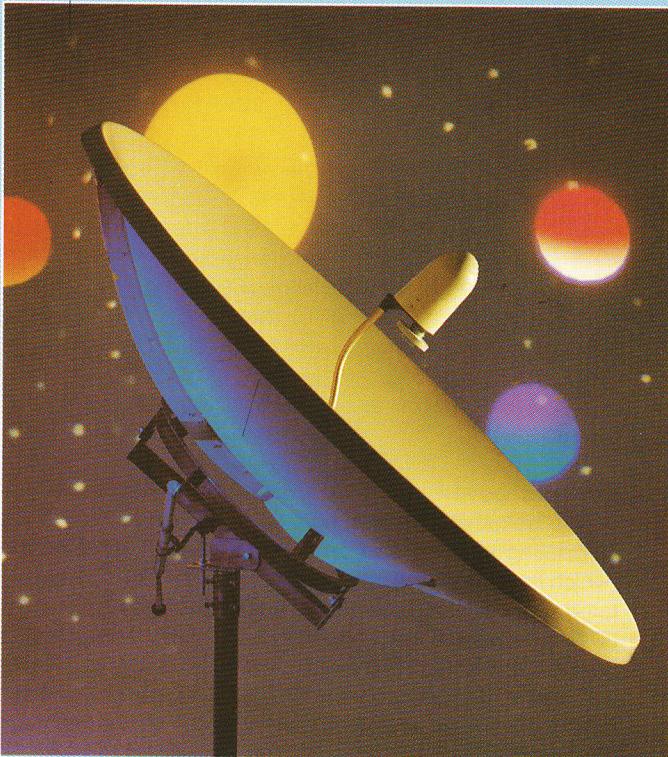
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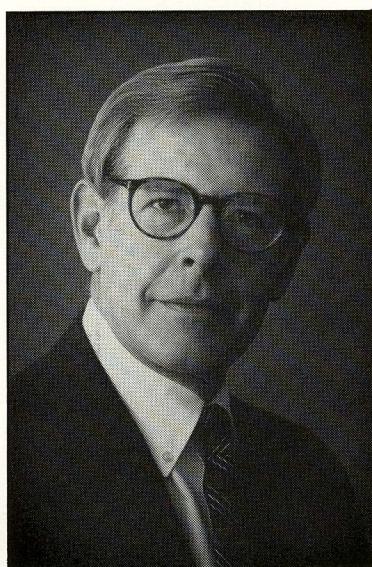
Choosing An Antenna Drive

At Superwinch, we utilize those technologies that result, first and foremost, in system reliability and durability. Simplicity and ease of operation are secondary criteria, with cost and bell and whistle features of little importance. We designed our own jack from scratch and were not constrained to use others products which were not intended, originally, for the TVRO industry.

The reed (magnetic sensor) was selected because it, unlike a Hall effect sensor, does not require shielded cabling or a constant supply of current. And, unlike a potentiometer, it is unaffected by temperature, humidity, and ambient currents. Since we employ two magnets, the pulse created by a partial 1/8 revolution is read the same as the accurate pulse created by a full 1/2 revolution. We eliminated this natural tendency of a reed sensor to gain or lose numbers by utilizing what we term a "hold-over" circuit which prohibits the motor from stopping on a magnet and tells it to continue. Another advantage is that the pulse is digital and does not, unlike other methods, have to be converted from analog to be used within the control console.

We don't believe anyone should rely solely upon electronic limits. Electromechanical micro switches with gold contacts were selected. Ours carry only milliamps and switch a heavy-duty relay in the control console which, in turn, switches the motor. We were unable to locate a domestic source for waterproof switches. We found ours, surprisingly, in the U.K. The lower limit, when activated by the travelling nut, tells the control to change its count to 0.0.0. This is our benchmark. This technique enables the jack to tell the control precisely where it is. The periods between the digits serve as our limit light.

We've solved the drive runaway and jam-up problems by using a strong pin to prevent the inner tube from unscrewing



FRANK F. TOLSDORF, President of Superwinch, Inc.

and we use Belleville washers, acting as compression springs, at each end of the stroke to assist the drive in reversing. Special circuitry also prevents accidental start-ups that could result from a loose connection or short circuit.

The challenge of a user-friendly, user-programmable control was met by employing the scanning principle. Sixteen LEDs, each representing a satellite, are used. In addition, a 3-digit counting LED tells the user where the dish is positioned.

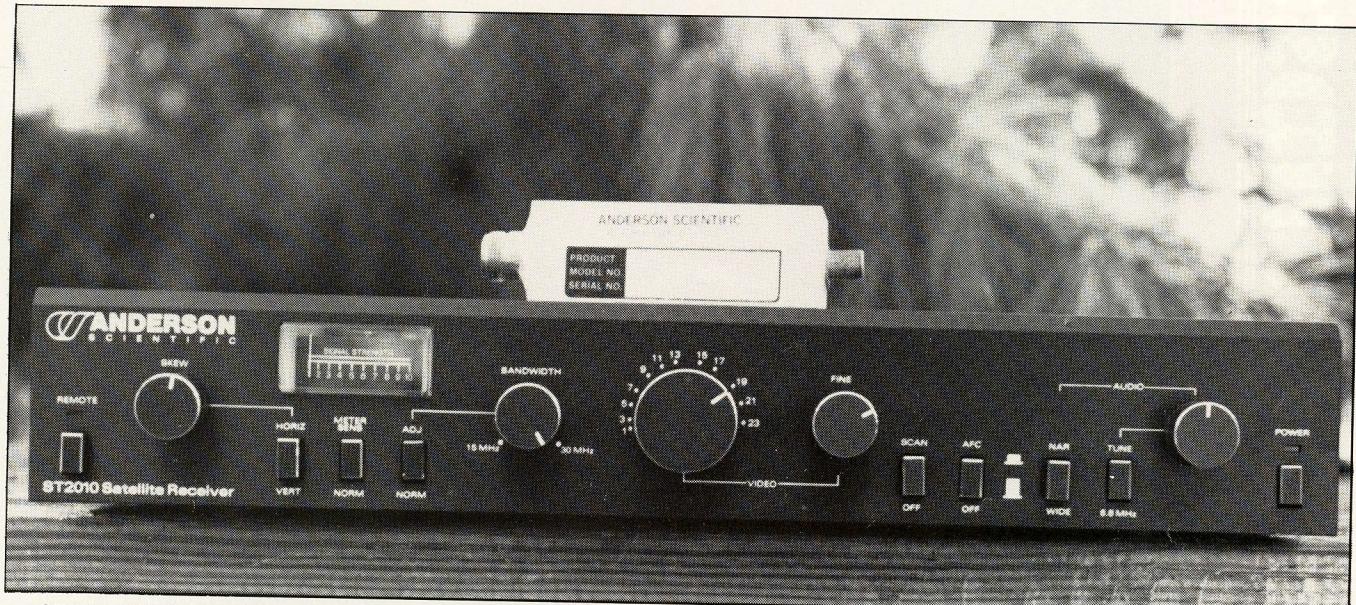
Using the control is as easy as lifting one's finger when the desired LED is lit. Ten of these are pre-identified in our factory and easy rub-on labels (F6,F7,G3,G4,etc.) are provided for future launches.

We looked at horizon to horizon drives two years ago. After calculating the PSI load on a single gear or sprocket tooth (which is, after all, the only thing holding the dish up), we hesitated. Our calculations were based on a 12 foot solid dish in an 80 MPH wind and the required gear or sprocket was big. Our position now is that HTH drives on smaller dishes are fine and we are working with several OEMs to supply only the drive head and controls. HTH systems require design integration of the mount and backframe. Dish OEMs can do this and we'll provide the drive and controls.

Weatherproofing is absolutely essential in the motor, transmission, and what we call the "control room." This has been done by extensive use of gaskets and by totally enclosing the motor within a shrunken vinyl boot. Weatherproofing of the tubes is impossible as it is a piston taking in and discharging air. The use of two O rings and two wipers keeps out the gross water and two drain holes are provided to enable the water formed by condensation to escape immediately from the tubes. We don't believe in bellows and boots — they make the problem worse by trapping moist air in.

In summary, pushing a dish up, pulling it down, knowing where it is, and telling it what to do is not that difficult. However, designing a drive system that will do it easily for years requires a complete understanding of the problems and a commitment to design in the required solutions.

Anderson BDC Receiver



ST2010 PACKAGE. Basic receiver (available in black [shown here] or silver finish) plus SC7 downconverter provides exceptional performance for the money from an American manufacturer.

Being First...

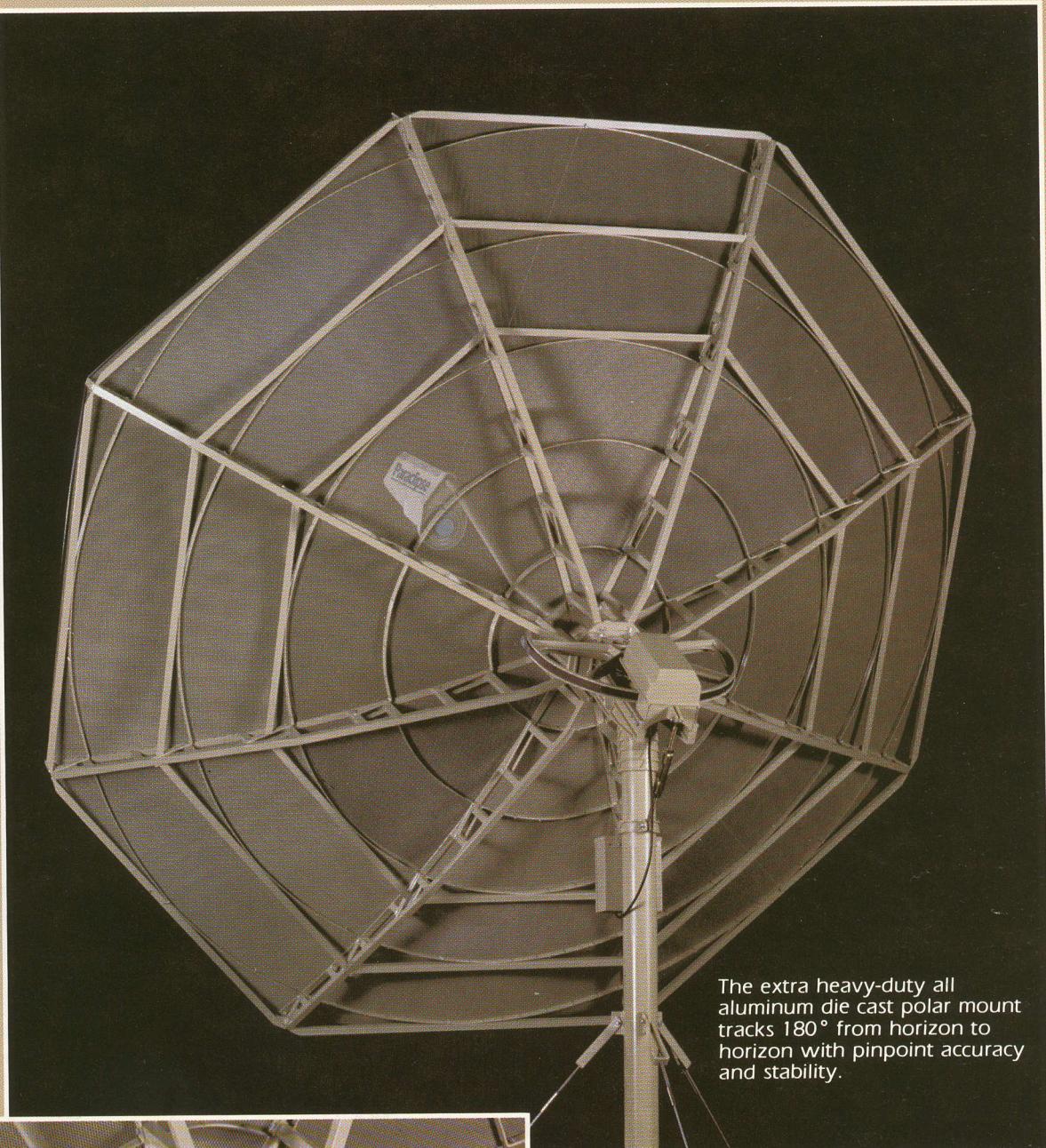
Few students of TVRO history would dispute that South Dakotan Keith Anderson created the low-cost block downconversion technique for TVRO. Anderson began his work in 1980 by modifying the TV tuner in a cheap Hitachi black and white television receiver so that it would directly demodulate a TVRO signal. When Anderson married the modified TV set (total cost of modification; under \$5) to a low-cost self-designed downconverter (total cost under \$10) he had the world's least expensive satellite TV system. The price? One TV set, one dish antenna and LNA, and \$15. A number of would be suppliers beat a pathway to Anderson's door seeking the secret of his technology. Anderson would ultimately keep those secrets to himself although a half-clever design engineer can reverse engineer Keith's work today by simply purchasing an Anderson BDC receiver and spending a week at the test bench. Several have done this, both within North America and offshore.

Anderson's original modified TV set format may have been his best idea to date since it certainly was the cheapest approach to home TVRO. But he was too clever for himself and when somebody noticed that by eliminating the TVRO stand-

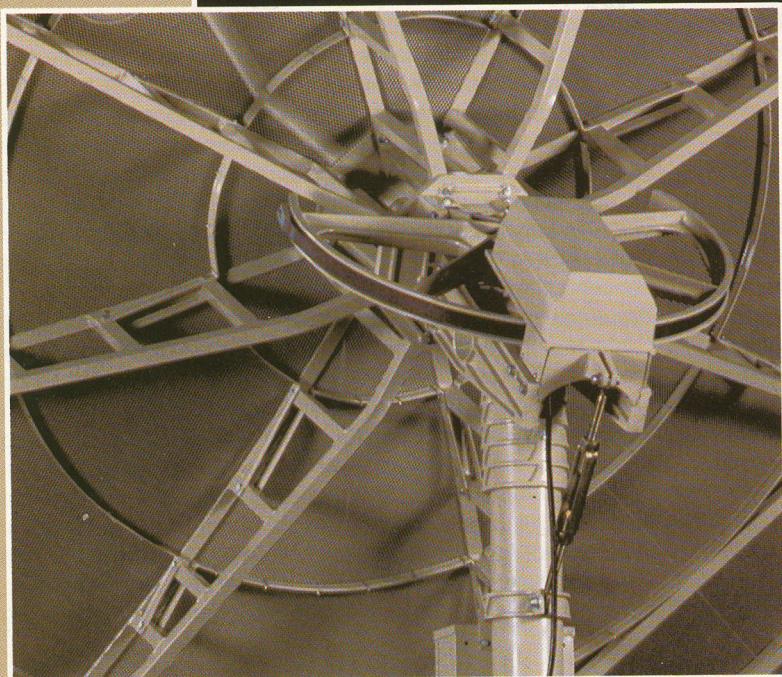
alone receiver, he had eliminated the product they wished to sell. The whole project back-tracked to a low-cost satellite receiver rather than a low-cost TV receiver that directly tuned in satellite broadcasts. Keith Anderson still suggests that one day his in-board TV set with a special demodulator for satellite broadcasts will be the accepted practice. For now, people continue to stack up component units (one TVRO receiver, one controller, et al) and continue to treat TVRO as an add-on-business. And to play that game, to allow himself the fiscal and conceptual freedoms required to build towards that eventual day, Anderson too has agreed to play in the component game.

Anderson Scientific is a medium-sized firm operating from the unlikely base of Rapid City, South Dakota. The firm presently averages more than 100 employees in a bulging-at-the-seams facility that looks just a little as if it had grown without adequate planning. The firm enjoys around seven to eight percent of the total market, and a talented, young management team which includes a significant number of people with the last name of Anderson. Keith's children run the company and share in its ownership while Keith is largely the father-head of the business which bears his name. He tends to design and

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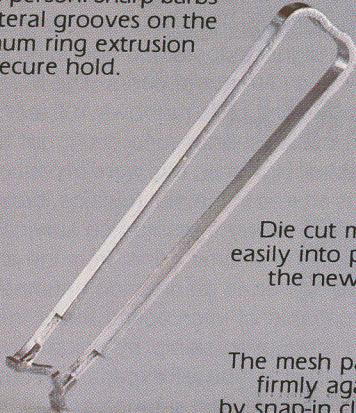
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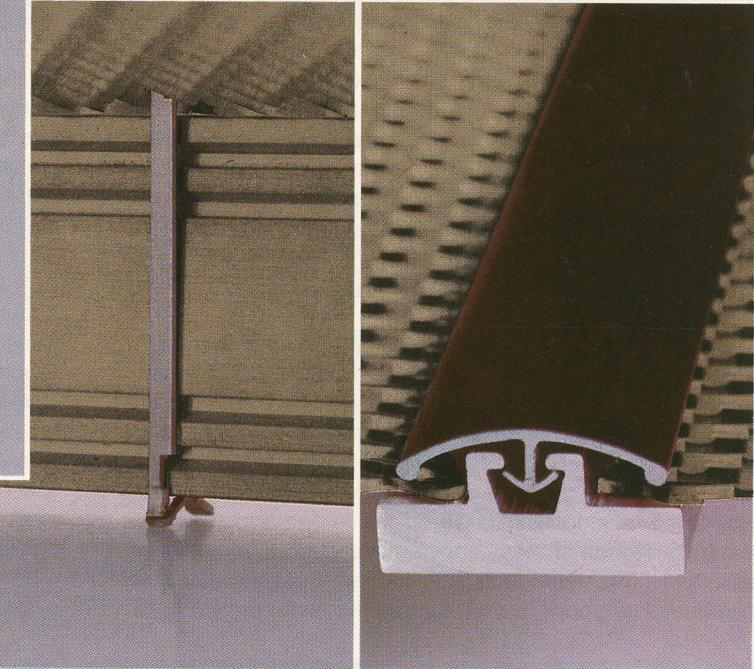
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engineering matters leaving the day to day production and distribution and management problems totally to his siblings. It works.

The Secret

Anderson receivers, from the first Hitachi modified TV receiver that directly tuned in and demodulated the satellite signals, have relied on a block downconverter designed by Keith. The basic premise of Anderson downconverters has not changed any since the first unit although certainly the internal component part selection, layout and operational characteristics have changed. From Keith's point of view, a downconverter needs to be reasonably stable, reasonably sensitive, ultra cheap, and ultra small. Actually, small may have come along as a benefit; it probably was not an original design criteria. Inside the Anderson downconverter are far fewer parts than you find in any other (non-Anderson-design-based) downconverter. A single transistor, running as a free running oscillator, does all of the hard conversion work. Engineers who grew up in more sophisticated surroundings than Rapid City, South Dakota, will tell you with great scholarly demeanor, "You cannot do it that way," and mean it. More than 60,000 Anderson receivers later, it would seem that you can, indeed, do it that way and not pay a penalty.

Keith is an astute student of balanced gain and not overworking or underworking any downconverter or receiver subsections. He has always had a rare talent for intuitive grasp of what is actually happening within a circuit and while others may spend days calculating resistor and capacitor values for a particular project or design, Keith Anderson pulls out a box of parts and proceeds to stick them in, one at a time, until he sees the end result he seeks. It is a talent rarely practiced anymore and those who possess this ability are a rare breed unto themselves.

Perhaps the real secret to Anderson products is Keith's own self-taught background in this and other fields related to TVRO (he designed many of the 1950/60 era television translators and this included the very first all-transistor or solid state units). He grew up convinced there was always a simpler, less complex answer to the problems of life and he practices this philosophy in his own life as well as at the work bench. By keeping circuits simple, Anderson avoids many of the built-in problems which others create for themselves. You can know so much that you overbuild a project.

Dealers should like Anderson products. They are fairly priced, simple to work on (internally and externally), and produce good pictures. In fact, tests conducted suggest that for real-world sensitivity, it is a rare receiver indeed that works any better than an Anderson. We'll look at that factor before we are done here.

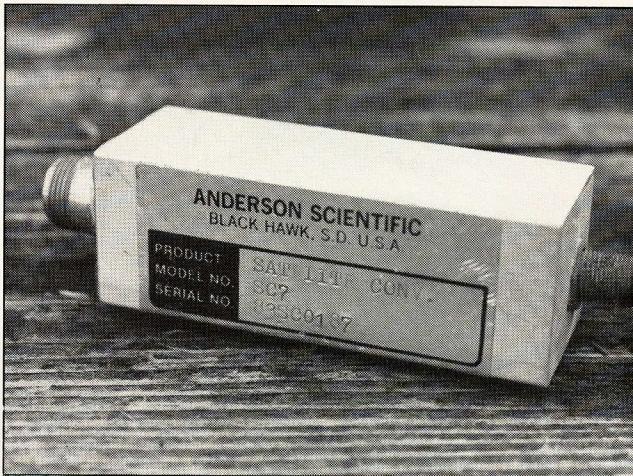
We suspect many dealers are frightened of Anderson products because (1) Anderson is not exactly a TVRO household name and, more important, (2) low price has always seemed to scare away those who are naturally suspicious of low price. In addition to that, there have been a number of Anderson look-alike products brought into the marketplace by firms who wanted to capitalize on the Anderson proven engineering. Not all of these copies have worked very well so dealers trying such products have formed an opinion that if the copy works so poorly, perhaps (probably?) the original is no

better. Fortunately for Anderson, those who have copied his work have missed a number of important nuances in the design including, in particular, the downconverter.

Other dealers are not impressed with the general appearance of the Anderson products, and while they are certainly far more customer pleasing as we enter 1986 than they were as recently as one year ago, style is not one of their benefits. So, there is room for improvement here.

Those who actually try an Anderson 2010 receiver will probably discover, as we did, that it is:

- (1) Stable.
- (2) Dial calibration is reasonable.
- (3) Pictures are good (especially on smaller dishes).
- (4) Sound is adequate, occasionally good.
- (5) The price is right.



TINY But effective. Anderson block downconverter can be field adjusted following manual provided instructions to reset 440-940 MHz range slightly in either direction.

The Anderson receivers are also exceptionally easy to use, both for the installer and the actual day-to-day user. The downconverter, being barely larger (longer) than a package of cigarettes can be tucked virtually anywhere. A single cable (RG59 or RG6) carries signal indoors and operating voltage for the downconverter and LNA out-of-doors. The IF signal is in the 440-940 MHz region and while runs over 100 feet should use the RG6 type of cable, shorter runs could get by with higher loss 59 type cables. However, one word of caution: The 440-940 MHz region is shared in the real (outside, broadcasting) world by various high power transmission services such as television broadcast. The incoming line, from the antenna plus LNA plus downconverter, is an untuned antenna and if above ground, very capable of intercepting these in-the-air transmissions. If you attempt to skimp by using low-grade (poorly shielded) coaxial cable, you will experience something called ingress; the cable acts like an antenna and adds these locally strong transmissions in the same (440-940 MHz) frequency range to the very weak satellite signals already there. The result can be interference or wipeout of the satellite signals. The solution is quality cable with high (90% or better) shielding factor.

(Those precautions apply to any cable used with any TVRO system although the 400-900 region IFs are especially sus-

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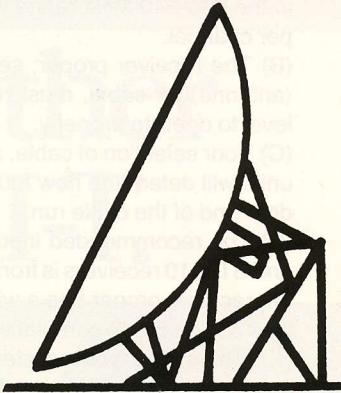
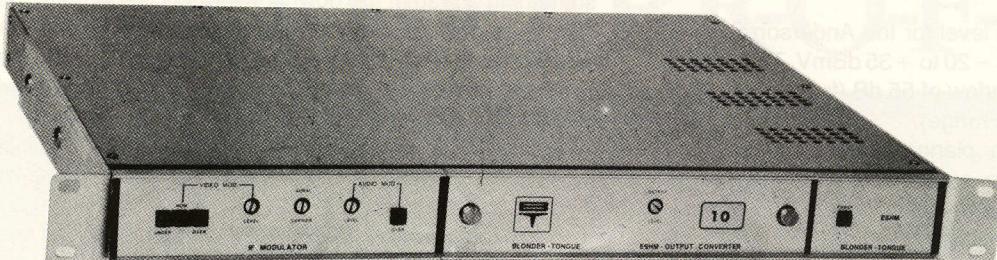
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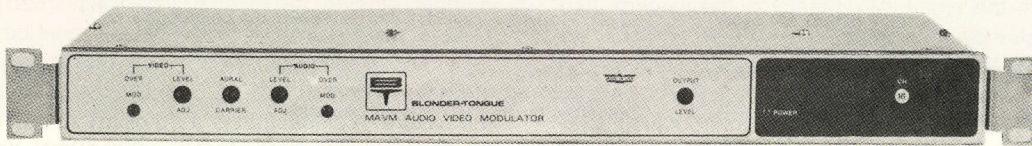
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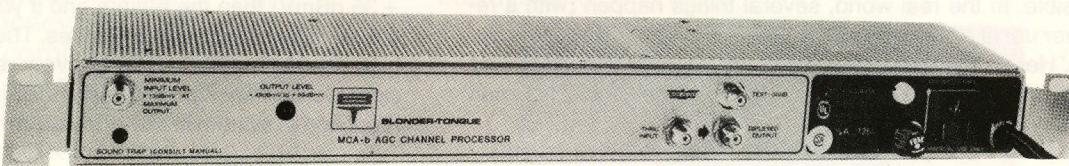
MAVM

Audio/Video Modulator



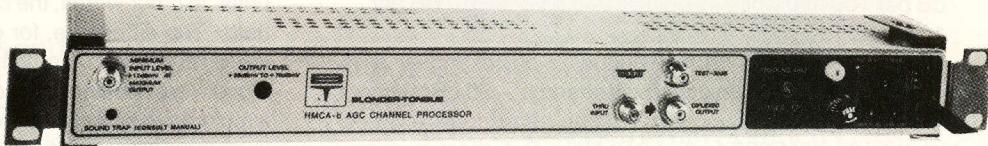
MCA-b

3 Volt Output VHF Processor



HMCA-b

6 Volt Output VHF Processor



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2 or more per order

CALL: TUTI OR VINCE
ESHM \$ 795.95 ea.
MAVM 399.95 ea.
MCA-b 200.00 ea.
HMCA-b 340.00 ea.

ceptible to this problem because of the high power - up to 5,000,000 watt - UHF TV broadcast stations operating here.)

Some basic engineering for any Anderson system will serve you well:

(A) The downconverter, tiny as it may be, produces an output in the 440-940 MHz range which is in the region of 15 dBmV per channel.

(B) The receiver proper, separated from the downconverter (antenna) by cable, must receive a certain minimum signal level to operate properly.

(C) Your selection of cable, and cable length between the two units will determine how much signal actually is left at the indoor end of the cable run.

(D) The recommended input level for the Anderson ST1010 and ST2010 receivers is from -20 to +35 dBmV. That means the receiver proper has a window of 55 dB (from minus 20 to plus 35 is a 55 dB cumulative range).

(E) Therefore, your system planning must calculate the amount of loss between the output of the downconverter (where we have typically +15 dBmV) and the input to the receiver (where we must have no less than -20 dBmV). This is a lesser window of 35 dB and in the worst possible (ie. marginal performing) case, we can stand up to 35 dB of cable loss between the downconverter and the receiver input.

That's quite a bit of cable loss, and we calculate our cable loss based upon the highest frequency in the system. 940 MHz is that frequency so when we look at selecting suitable cable, we try to determine how much loss (per 100 feet) the cable has at 940 MHz. Most cable data sheets list loss at 900 MHz and 1,000 MHz so a small amount of interpolation is required between the two. Or, you can play it safe and simply use the higher frequency (1,000 MHz) number.

Some dealers go through this exercise and think that they can push runs to 500 or even 600 feet. On paper, that looks feasible. In the real world, several things happen (with a receiver using a block IF) when you start stretching the runs like this. Here are some examples of the negative effects of long runs, and you may spot a symptom or two here which you can identify with:

(1) High End Goes First. In this situation, because the cable loss is higher at 940 MHz than it is at 400 MHz, the block IF 'tilts' the signals through the long cable run. An example: Alpha (brand) number 9059 cable is a 95% shield copper braided cable. The loss at 440 MHz is 6.7 dB per 100 feet while the loss at 940 MHz is 10.7 dB per 100 feet.

We said we had a 35 dB window in our example; +15 dBmV output from the downconverter and a -20 dBmV input (minimum) at the receiver. So, we can afford to lose 35 dB which works out to 327 feet at 940 MHz. But, there is something called tilt.

While the 940 MHz is dropping 35 dB in level between the downconverter and the receiver, the 440 MHz signal is dropping only 21.9 dB. That means that while the full transponder band started out at the LNA/downconverter quite equally from channel to channel, by the time we get indoors the receiver sees the lowest channel some 13.1 dB stronger than it sees the highest channel. As you might suspect, this can be taxing on the receiver circuits and the user will notice some definite picture changes from transponder 1 to 24 (2 to 23 and so on).

(2) Signals good, pictures poor. This occurs when the signal voltage from the downconverter is low to begin with. The assumption is that you have +15 dBmV output from the downconverter; all other calculations and assumptions flow from that assumption. But if the downconverter signal is low, for whatever reason, then the balance of the assumptions and calculations are worthless.

A +15 dBmV output from the downconverter assumes several things; that the dish is big enough (ie. simply has adequate gain), that the LNA is high enough gain (a low gain LNA will reduce the output level of the downconverter). If something ahead of the downconverter is inadequate, be design or by malfunction, then the downconverter receives too little signal. In turn, it puts out too low a signal and that means that the receiver also ends up with too little signal. The whole package is interrelated.

(3) Grainy Pictures. When Anderson tells you the minimum input is -20 dBmV, they are advising you of a true worst-case situation. You should not suppose that if you supply the receiver with -20 dBmV that the pictures you see will look as good as they would if the input was +15 dBmV. They won't.

All receivers, in fact, all receiver systems, have their own built-in noise factor. The noise factor is essentially the same (a number) whether the receive system is pointed at a satellite or at the cold sky. The pictures you see must be stronger than this noise factor or you will see noise, not pictures. How much stronger the signal is, than the noise, determines the clarity of the picture. A signal that is +15 dBmV to the receiver will be 35 dB stronger than one that is -230 dBmV. You will see and find remarkable difference in picture quality when you see this comparison. The fact is that you want to end up closer to the top end of the recommended input level window (-20 dBmV to +35 dBmV) than the bottom end if you want happy customers. And the best possible pictures. There is no substitute for a high signal-to-noise ratio and every reduction in signal level closer to the minimum recommended input of -20 dBmV is a reduction in system clarity and performance.

Performance

Anderson builds several variations of their basic receiver but the truth is that the electronic circuits that produce your basic satellite picture and sound are virtually identical in all units. In other words, the circuit boards are shared between all units. The difference, for example, between the ST1010 and the ST2010, is in the bells and whistles department. If Keith alone were building the receiver they would be as basic and as simple as they could be. Mark, Alan, and August (Anderson), in charge of production, distribution, and sales have found what all other TVRO receiver sellers have found; people do like 'gadgets' because gadgets give people something to show off to their neighbors, and play with. So the 2010, a top of the line (for Anderson) type product, has some features in it that allow people to show off and play.

Even with the additional features of the 2010, Anderson products are still pretty laidback when compared to the bell and whistle machines coming out of the Far East these days. The receivers still reflect people's basic concern that their television pictures work well, for a minimum investment.



Put them both together they spell P-R-O-F-I-T.



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OPERATIONAL controls/ST2010. Polarization select has skew control for fine tweaking of the probe. Two-level meter sensitivity allows fine tweaking of the dish (nice touch)



MORE Operational Controls. Audio can be tuned over full range and has preset 6.8 MHz. Both wide (not specified) and narrow (also not specified) are available and receiver has scan tuning for satellite locating.



VIDEO Bandwidth. In the normal position, it is set at 28 MHz while with this control operating the user can tweek for best picture with an effective IF of as little as 15 MHz. It works, but not as well as you might wish.

(1) IF Bandwidth. Most receivers you are familiar with provide you with a single, factory-set and adjusted IF bandwidth. That's the parameter that determines how much of the original designers routinely narrow the IF to improve the performance of the receiver under weak signal conditions. And receiver designers routinely widen the bandwidth to improve the picture detail (clarity) under strong signal conditions. Only this has always been done at the factory and once set, not touched. Keith Anderson has brought the user in touch with this function and the 2010 receiver has a tuneable (as in adjustable) IF bandwidth that Keith says allows the user to select a (continuously variable) bandwidth between 15 and 30 MHz.

What this control does is to adjust some tuned circuits which shape the bandwidth. A totally adjustable bandwidth system would require several dozen adjustments, made in unison and made in a parallel (side by side) fashion. That is possible, but not likely given the complexity of the tuned circuits involved.

We found the bandwidth tuning control interesting, even helpful in some situations, but not dramatic. We really doubt anyone would purchase this receiver because of this feature. On Intelsat signals, which are often only 14 to 17 MHz wide, we found there was some improvement in the most-narrow position, but not as much as when we switched between two fixed IF bandwidth systems in a far more expensive AVCOM receiver.

(2) Fixed Audio. Many receivers offer the user switch-selected 6.2 and/or 6.8 MHz audio subcarrier fixed tuning, and many also offer a tuning system so the user can tune in any subcarrier transmitted between 5 and 8 MHz (or some other number set). The 2010 offers 6.8 as a pre-set (factory tuned) click-stop selection plus the knob also has continuous tune as well for any audio subcarrier frequency between 5.0 and 7.5 MHz.

Audio performance on the 2010 is the best of any Anderson yet. That's the kind of statement a reviewer makes after he has spent sixteen years driving each successive year's new Chevrolets and still finds them lacking. They keep getting better, but... he is still not satisfied with the way they drive.

That's our response to the ST2010 audio. It is far better than some early Anderson products and perhaps it is as good as 95 (or even 99) percent of the people would expect. But we still find the tuning slightly erratic, the crispness of the audio slightly muddy, and the audio generally slightly on the bass side. Maybe that is the way Keith likes audio, and per combinations, they'd find a crisper, solid tuning, higher pitched audio system to build into the next receiver model. And maybe we'll be back in another year saying that their new (GST) model is the best of any Anderson yet.

Not Traditional

The ST2010 has video/audio baseband outputs (to drive an external modulator, a VCR deck, projection receiver) as well as the usual modulator. The modulator operates on (field accustomed to doing everything on 3 and 4 or 2 and 3).

Channels 5 and 6 make excellent sense as it turns out. If you are interfacing a system for a customer, and he has a VCR, chances are his VCR is outputting on 3 or 4. Now you can use A/B switching or a combiner and allow the customer to

dial between satellite TV (say channel 6) and VCR (say channel 3) and without any real cable swapping, he has the best of both worlds.

Anderson now supplies a quite unique 12 volt (DC) power supply for their receiver line. That means you can take a portable satellite system where power does not come out of a wall outlet (such as in a mobile home). To the best of our knowledge, this may be the only such receiver package available today.

The manual is of special interest to anyone who has tired of handing a customer a technical data sheet supplied from the receiver OEM and saying "Here, these are your instructions." In the past, we noted that the Panasonic C-2000 receiver manual was a special example of high quality consumer planning. In many ways, the Anderson manual is an even better example.

1) 56 Pages. How many products in this field have 56 page manuals? Not many.

2) Operation/introduction. Anyone who can read could follow the use of the controls.

3) System options. Complete description of multiple and single receivers, single and dual feed (polarization) systems, cabled (SMATV/MATV) distribution systems, and it even tells you how to reset the downconverter block IF range.

4) Distribution systems. A veritable guide to planning and building large scale coaxial cable distribution systems. And for the serious planner, the "Anderson Scientific Applications Manual" is a textbook to complex system planning.

5) Field Modifications. It is difficult enough to get a factory to send a schematic (Anderson will) but how about a manual that tells you how to modify the receiver for improved performance? This manual does, down to part by part change instructions, for such things as strengthening the AFC (automatic frequency control), a useful trick if you are using these receivers for fixed channel service, such as in an SMATV system.

6) Installation suggestions. A guide to coaxial cable types, the loss of cables at 440 and 940 MHz, a guide to line amplifiers and their specifications, and a guide to acceptable power supply and switching products for special applications.

7) Troubleshooting Guide. Twelve common problems, 25 corrective steps or solutions. Exceptionally well done.

If there is a more thorough manual out there for a receiver product, it has not been brought to our attention.

Synopsis

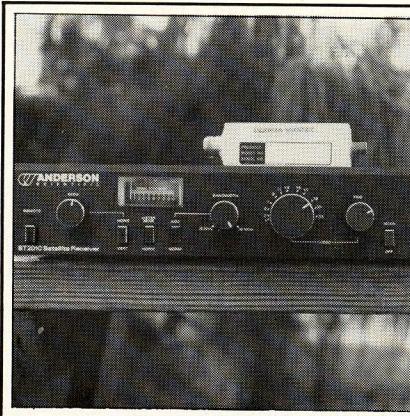
The Anderson ST2010 receiver is not the best receiver on the market, but it is one of the best performing and if you consider its low cost to dealers, it is perhaps the most cost effective TVRO receiver available today.

Anderson has good distribution, good visibility, and a good product at a very fair price. What the firm lacks is wider recognition of its 'Made In America' status, its central location, where overnight service is a viable assistance to dealers, and a designer to come in and dress up the physical appearance of the receiver.

This is a workhorse receiver product which should work well out of the box and for years to come. Priced at the low end, it offers features which the typical dealer should have no trouble translating into system sales.

Some dealers have told us that the stability of the receiver is not adequate. We have been using Anderson products for several years and could identify with some minor instability on a long term basis on earlier Anderson receivers. We found no problem with the stability of the ST2010 and want to redirect you to the manual which tells you how to stiffen the AFC should you find that for your application the stability is not adequate. The receiver has been designed to make the customer satisfied with the feel of the tuning knob; a continuous tune knob. For normal use, a very stiff AGC will snap ('lock in abrupt steps') from channel to channel so in the normal consumer versions, the AGC is purposefully left a little loose. This we feel is a proper compromise and for those situations where you do need rock solid stability, such as for SMATV applications, the solution is on page G-1 of the manual.

The Anderson TVRO hardware philosophy is very straight forward. It comes from a closely knit family which grew up in TV and TVRO. They are the heart of America as perhaps no other family run business in TVRO. There are dealers out there who would identify with both the philosophy and the products.



ANDERSON ST2010 SPECS

Input Range: With SC7/SC24 downconverter, 3.7 to 4.2 GHz
Downconverter Gain: 10 dB port to port typical

Downconverter Output level: Typically + 15 dBmV per channel

Downconverter Noise Figure: Not specified (11.7 dB average measured) 2010 Receiver

- 1) IF Range: 440 to 940 MHz (field matched to downconverter if required)
- 2) IF Bandwidth: 28 MHz standard but 15 to 30 MHz tuneable
- 3) CNR Threshold: 8 dB claimed, between 8 and 9 dB measured
- 4) Audio Sub Tuning: 5.0 to 7.5 MHz fixed at 6.8 MHz
- 5) Baseband Output: 1 volt negative sync video and 20 volts ptp audio
- 6) RF Output: Channels 5 or 6, selectable, between 1,000 and 2,000 microvolts (+ 6 dBmV)

Source: Anderson Scientific, Inc., 2693 Commerce Road, Rapid City, SD 57702, 605/341-3781.



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UST 730



UST 2000



UST 5000

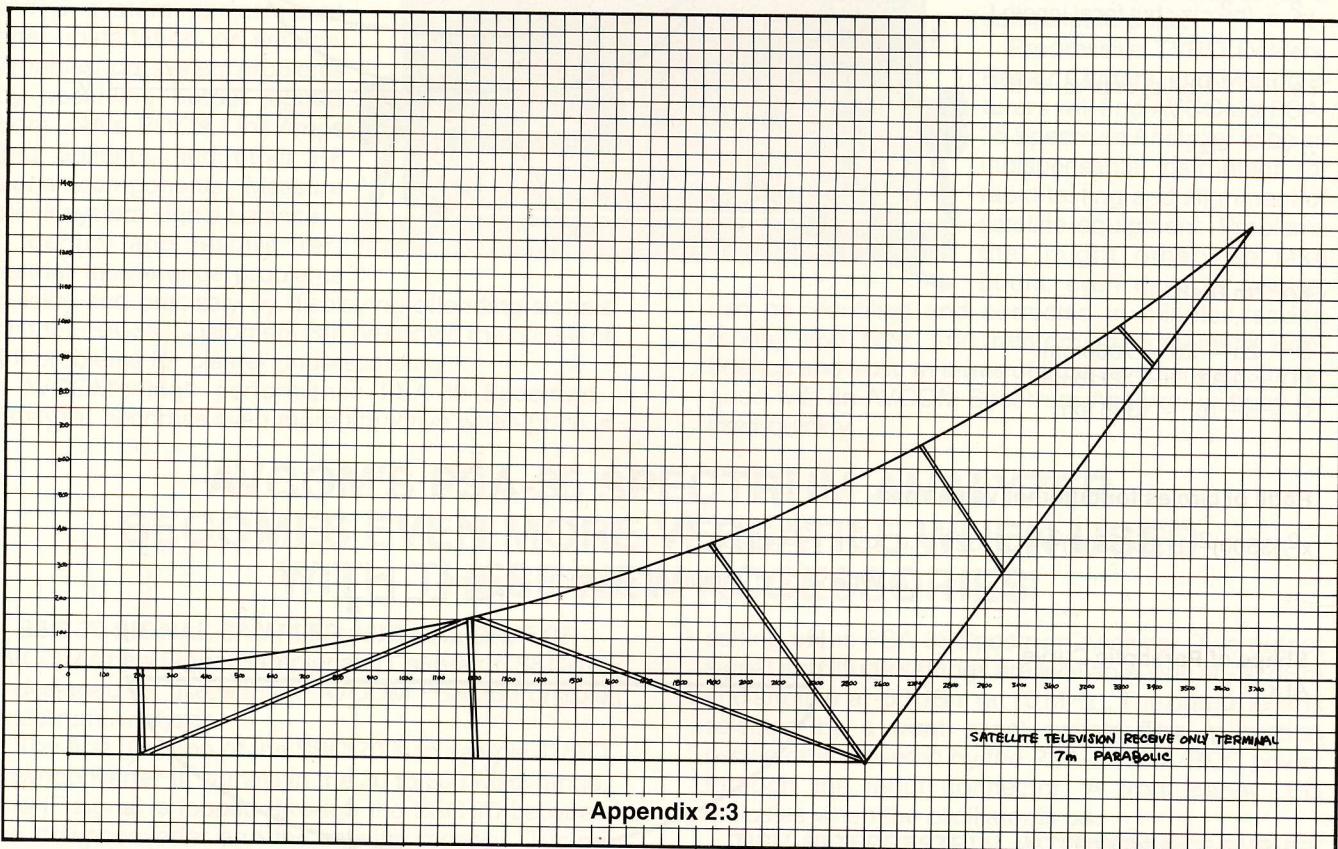


UST 7000

Jamaican 7-Meter Dish

Part II

by Hugh G. Brand



Antennas based on paraboloidal reflectors are the most important type for the microwave bands. Their advantages are that they can be made to have as large a gain as is required and can operate at any frequency. The disadvantages are that they are not easy to make accurately and large sizes are encountered. Also, they are difficult to mount and may have high wind loading values.

The basic property of a perfect paraboloidal reflector is that all the energy received by dish from a distant source is reflected to a single point at the focus of the dish. This makes for a compact structure and most of the antennas for satellite television are of the parabolic type. "How accurate must a parabolic surface be?" is a frequently asked question. According to the Rayleigh limit for telescopes, little gain increase is realized by making the mirror accuracy greater than $\pm 1/8$ of the wavelength peak error.

John Ruze of MIT Lincoln Laboratory, among others, has derived an equation for parabolic antennas and built models to prove it. The tests show that the tolerance loss can be pre-

dicted within a fraction of a decibel and less than 1 dB of gain is sacrificed with a surface error of $\pm 1/8$ of the wavelength. It has been more or less standard to aim for a surface error not exceeding 1/10 of a wavelength in satellite TV work. One-tenth of a wavelength is 7.5mm at 4 GHz or 0.295 inch.

In this design, we worked to and obtained a peak error of 1/8" i.e. the peak deviation from the true paraboloid at any point on the curve of the rib did not exceed 1/8". We achieved this by plotting the curve accurately to scale on a flat surface in accordance with the profile shown in Appendix 2:3. We then plotted two (2) similar curves on either side, but 1/8 of an inch different; i.e. $\pm 1/8$ " was inserted in the equation and the curves plotted alongside. The aluminum channel forming the surface of the rib was then bent to shape, making sure that at no point did it cross the outer limits. In this way, we achieved a peak deviation of 1/8" which gave a loss in gain of less than .5 dB.

Appendix 2:1 shows various calculations relating to the paraboloid dish. These calculations are necessary to obtain the shape of the curve, the area of the parabolic sectors in

DISH CALCULATIONS

(a) Basic Equations Elliptic Paraboloid

$$x^2/a^2 + y^2/b^2 = z/c$$

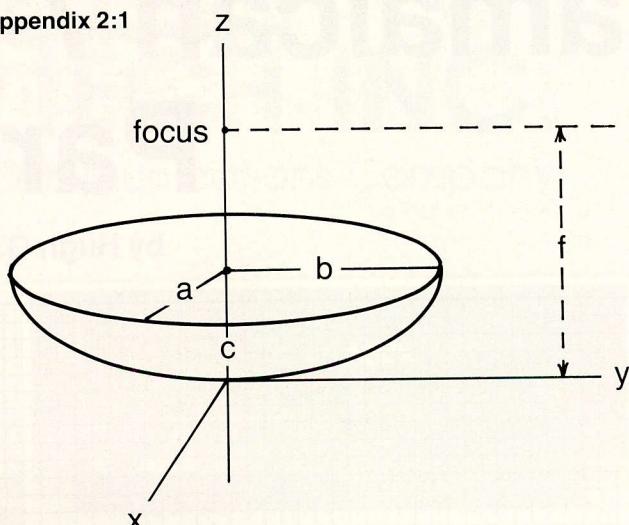
For section through YZ Plane, $X = 0$

$$y^2 = (b^2/c)z : \text{but focal length } f = \frac{(radius b)^2}{4 \times (\text{depth } c)}$$

$$\text{i.e. } f = 1/4(b^2/c) \text{ or } b^2/c = 4f$$

$$\therefore y^2 = 4fz$$

Appendix 2:1



For 7m Dish

$$D = 2a = 2b = 7000\text{mm}$$

$$f/D = 0.33 \quad f = 2310\text{mm}$$

$$C = D^2/16f = 1326 \text{ mm}$$

Radii of circles for different values of z

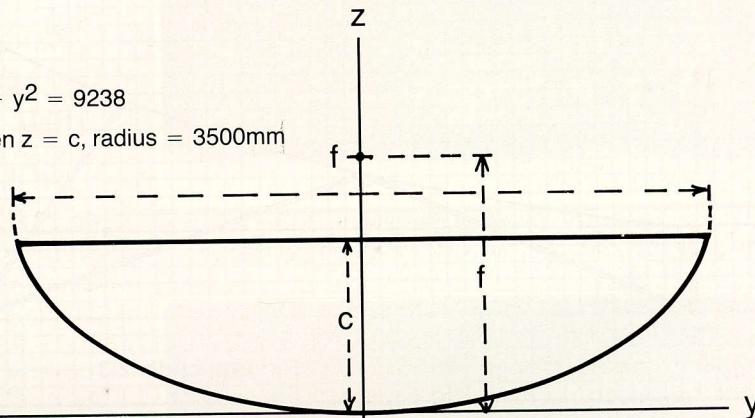
$$x^2/(3500)^2 + y^2/(3500)^2 = z/1326 \quad \text{i.e. } x^2 + y^2 = 9238$$

i.e. When $z = c$, radius = 3500mm

Shape of Parabolic Curve

At $x = 0$

$$y = 4fz = 9240z$$



Appendix 2:1 continues on page 52

order to work out requirements for surface sheeting, the length of the parabolic arc for the same purpose and also the center of gravity, in order to determine the torque required to move the dish. These are standard formulae and it is only a matter of fitting in the required dimensions and figures.

Dishes up to a few feet in diameter are usually made from solid materials. With increasing size, wind loading starts to become a severe problem. At a wind speed of 60 MPH for example, and this is not an uncommon value, the force on a flat object is over nine pounds per square foot. The structure supporting a dish 20 feet in diameter will suffer a wind force of nearly 3000 lbs, or 1 1/3 tons, on top of which the normal engineering safety factor of five should be applied. Fortunately, dishes in which the main reflecting surface is a mesh can be used with success, the loss in total gain being a function of the mesh, as shown in Appendix 2:4. This shows that with a mesh

of 1/2" x .081 flattened aluminium, the average loss in gain was 1.6 dB, but with a mesh of .040 aluminum strand the loss in gain was .17 dB. The former sheeting corresponds to an open area of 70% and was used on the original dish, while the latter corresponds to an open area of 60%.

The reductions in wind loading force are such that the foundation can be made a much more reasonable size and for less cost, therefore far outweighing the small loss in gain of .17 dB.

To achieve high efficiency, the dish must be illuminated evenly over its entire surface. It is therefore desirable to control the beamwidth of the feed in both horizontal and vertical directions. These problems have been satisfactorily overcome in the TVRO industry by the simple Chaparral-type feed and the dish at York Castle Avenue uses this method. Other feeds are on the market and are just as successful. Many incorpo-

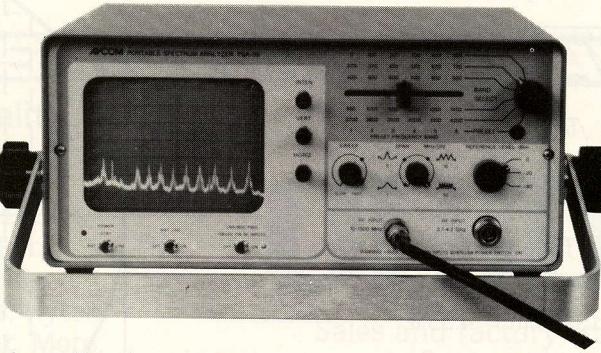
TAKE ALL THE GUESSWORK OUT OF TVRO INSTALLATIONS AND T.I. ANALYSIS WITH AVCOM'S NEW PSA-35 PORTABLE SPECTRUM ANALYZER

ASK ANY TVRO DEALER WHO OWNS AN AVCOM PSA-35 PORTABLE SPECTRUM ANALYZER.

With AVCOM's PSA-35 Portable Spectrum Analyzer you can measure and document TVRO system performance after installation or service. Troubleshoot system problems by observing output signals from LNA's, BDC's, Line Amps and Splitters, and other RF signal components. Measure block system signal balance.

Identify and resolve Terrestrial Interference problems quickly and precisely by displaying offending signals on the PSA-35. Customers can be shown the nature of T.I. problems for clearer understanding.

AVCOM's high performance PSA-35 Spectrum Analyzer becomes even more attractive when price is



considered. The PSA-35 is \$1965. Nothing on the market offers its performance at a comparable price.

Progressive TVRO Dealers, Repair Centers, and Manufacturers will find AVCOM's PSA-35 Spectrum Analyzer to be an indispensable instrument for rapid testing and alignment of satellite equipment. Problems that might otherwise take hours, even days to resolve, can be identified and corrected in minutes, saving money and time, and reinforcing customers' confidence and trust. In terms of time saved and customer good will, an AVCOM Spectrum Analyzer will pay for itself quickly.

AVCOM'S PSA-35 SPECTRUM ANALYZER BECOMES EVEN MORE VERSATILE WHEN USED WITH THESE NEW ACCESSORIES!

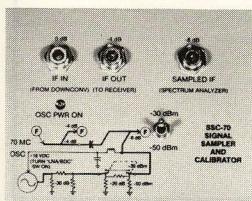
SSC-70 SIGNAL SAMPLER AND CALIBRATOR — AVCOM's new Signal Sampler and Calibrator, SSC-70, is designed for use with the AVCOM PSA-35 Portable Spectrum Analyzer.

The first function of the SSC-70 is to sample TVRO downconverter IF signals in the 30 to 200 MHz range. The IF signal is looped through the SSC-70 between the downconverter and the satellite receiver. Tuning

voltage present in the IF coax is passed from the receiver to the downconverter unaltered. The IF signal is sampled and is available on the "SAMPLED IF" F-fitting. The PSA-35 Spectrum Analyzer is connected to this port and the IF signal can be accurately measured and examined.

If Terrestrial Interference filters are in the IF coax line, they can be tuned precisely so that video quality is preserved while T.I. is minimized.

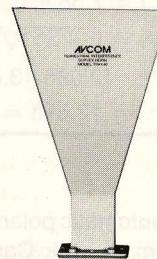
Also an internal oscillator operating at 70 MHz, with harmonics at 140 MHz and beyond provides a quick means of checking amplitude calibration and frequency



setting of the PSA-35 Spectrum Analyzer. Two output signal amplitude settings are available, one at -30 dBm and another at -50 dBm (at 70 MHz). The output level is selected by a front panel switch. The calibration oscillator is powered by the PSA-35 LNA/BDC power through the input connector. A front panel LED indicates when the oscillator is on.

TISH-40 TERRESTRIAL INTERFERENCE SURVEY HORN — AVCOM's new Terrestrial Interference Survey Horn, TISH-40, is designed to be used in conjunction with the PSA-35 Portable Spectrum Analyzer for site surveys.

The TISH-40 Terrestrial Interference Survey Horn features 18 dB gain in the 3.7 to 4.2 GHz range of frequencies. It is highly directional with high gain and rugged construction. Terrestrial Interference sources can be pinpointed quickly and accurately to increase the utility of the versatile PSA-35 Spectrum Analyzer. 1/4-20 stainless nuts pressed into the flange make LNA assembly and disassembly quick and easy.



FOR MORE INFORMATION WRITE: AVCOM, 500 Southlake Blvd., Richmond, VA 23236 or call (804) 794-2500. To order, call, 1-800-446-2500.

AVCOM's PSA-35 — THE MOST VALUABLE TEST INSTRUMENT YOU CAN BUY FOR INSTALLING AND SERVICING TVRO SYSTEMS!!

Appendix 2:1

(b) Area of Parabolic sectors

$$\text{Area of Element} = 2\pi y \, ds$$

$$ds^2 = dy^2 + dx^2$$

$$\therefore ds = \sqrt{1 + (dy/dx)^2} \, dx$$

$$\begin{aligned} \text{Total Area} &= 2\pi \int y \sqrt{1 + (dy/dx)^2} \, dx \\ &= 2\pi \int \sqrt{4fx} \cdot \sqrt{1 + (dy/dx)^2} \, dx \\ &= 4\pi \int \sqrt{x + x(dy/dx)^2} \, dx \end{aligned}$$

Differentiating Equation $y^2 = 4fx$

$$2y(dy/dx) = 4f \therefore dy/dx = 4f/2y = \sqrt{f/x}$$

$$(dy/dx)^2 = f/x$$

$$\begin{aligned} \text{Area } S &= 4\pi \int \sqrt{x + x(f/x)} \, dx \\ &= 4\pi \int \sqrt{f + x} \, dx = 4\pi \sqrt{f} [(f + x)^{3/2}/3/2] \\ &= 8/3\pi \sqrt{f} [(f + c)^{3/2} - f^{3/2}] \end{aligned}$$

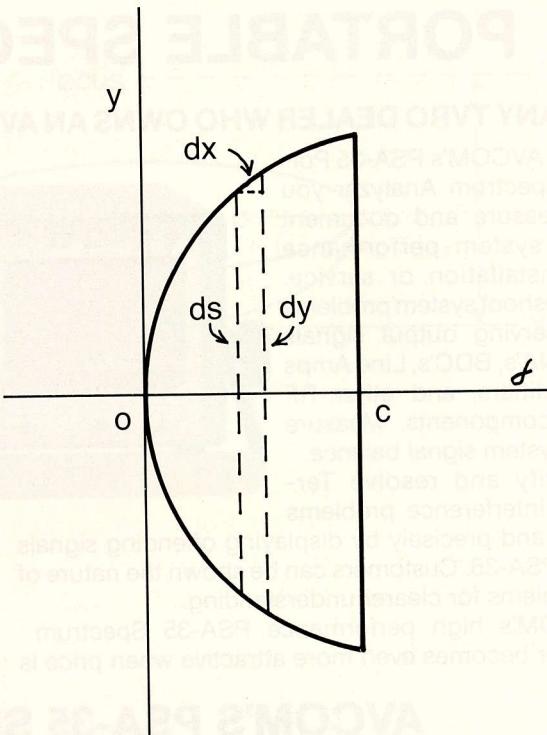
$$f = 2310 \text{ mm} = 7.58 \text{ ft} \quad C = 1326 \text{ mm} = 4.35 \text{ ft.}$$

$$\text{Area } S = 8/3 \times \pi \times 2.75 [(41.2 - 20.87)] = 469 \text{ ft}^2$$

$$\text{Number of sectors} = 30 \quad \text{Area of sector} = 469/30 = 15.6 \text{ ft.}^2$$

Sheeting is supplied in 8 ft x 3 ft or 8ft x 4ft sizes

Optimizing the sector on each sheet, gives 30 sheets 8' x 3' required



(c) Length of Parabolic Arc

$$\text{Sector length } S = \pi D/30$$

$$= \pi \times 7000/30 = 733 \text{ mm} = 2.4 \text{ ft.}$$

$$\text{Length of arc } A = \sqrt{1 + (dy/dx)^2} \, dx$$

$$(dy/dx)^2 = f/x$$

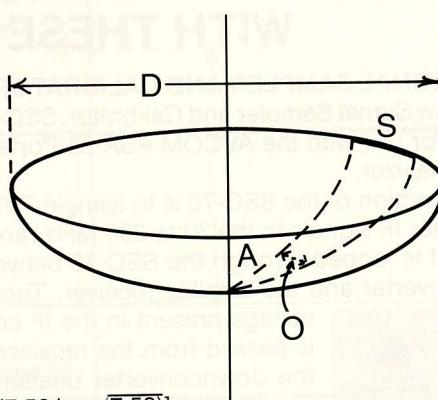
$$\begin{aligned} \therefore A &= \int (1 + f/x)^{1/2} \, dx \\ &= \int \sqrt{x + f} \, dx \\ &= [\sqrt{x} \times \sqrt{x + f} + f \log e \quad \sqrt{x + \sqrt{x + f}}]_0^c \end{aligned}$$

$$f = 7.58 \text{ ft}, C = 4.35 \text{ ft}$$

$$\therefore A = [\sqrt{4.35} \times \sqrt{4.35 \times 7.58} + 7.58 \log (\sqrt{4.35} + \sqrt{4.35 + 7.58})] - [7.58 \log \sqrt{7.58}]$$

$$= [2.086 \times 3.45 + 7.58 \log (2.086 + 3.45)] - 7.67$$

$$= 12.51 \text{ ft} = 3813 \text{ mm}$$



rate automatic polarization and skew and work very well. The system at York Castle Avenue incorporates the Chaparral Polarotor in which a servo motor moves a small pick-up probe within the feed system for the correct polarization and skew.

Appendix 2:2 shows a general arrangement of the dish and feed system. Other feed systems were experimented with, in particular the Cassegrain. This has the advantage of providing the highest possible gain, and the fact that the LNA is behind the reflector. The disadvantages are the cost of the subreflector and the scattering caused by the structure that supports the subreflector.

The prime focus feed, on the other hand, has the advantage of lower feed cost and the disadvantage of lower gain and having the LNA at the focus, which is usually difficult to reach.

The North American satellites utilize linear polarization in which use is made of vertical and horizontal polarization to achieve frequency re-use, i.e. the utilization of the same or nearly the same frequency for different programs. The Chaparral Polarotor used allows this change in polarity to be achieved simply by a servo motor. International satellites, on the other hand, utilize circular polarization which may be right-

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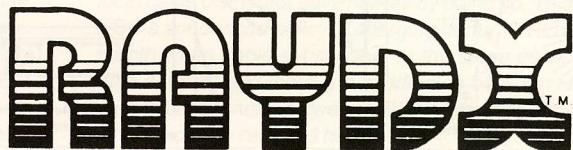
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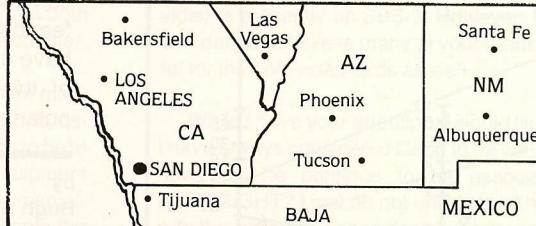
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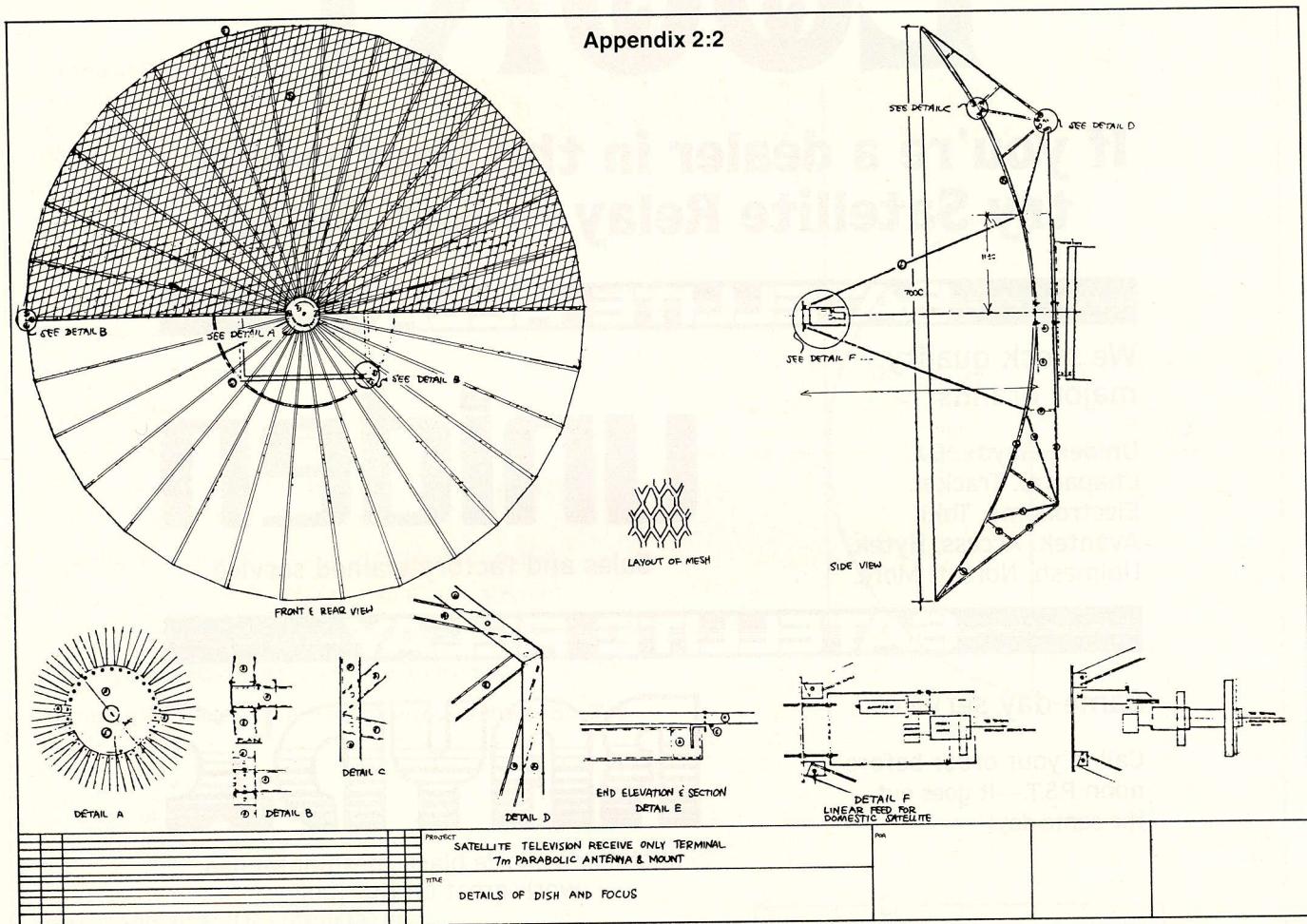
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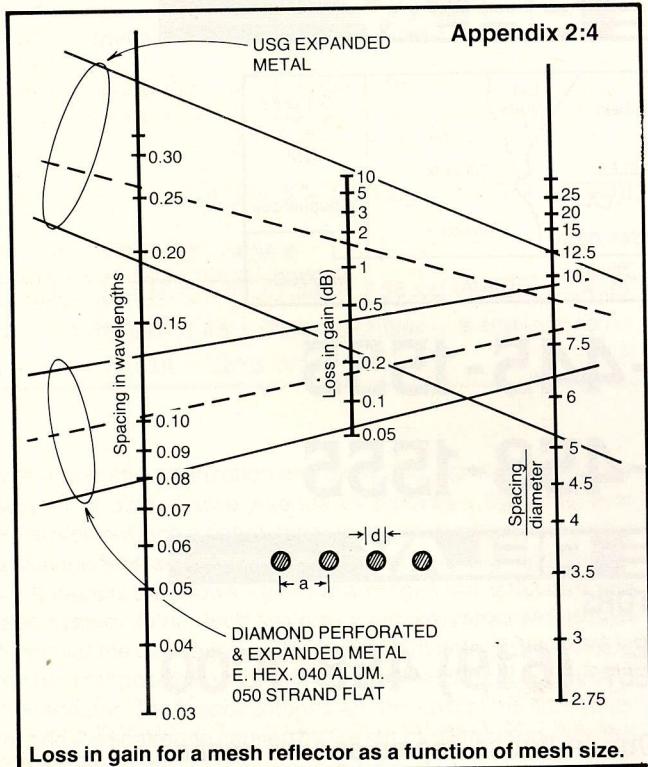
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Appendix 2:2



Appendix 2:4



hand or left-hand. A linear feed, when picking up a circular polarized wave, will suffer a three decibel attenuation. This can be overcome quite simply by fitting a teflon slab into the feedhorn. It makes the circular wave guide of the feedhorn behave as if it is wider in one direction than the other. The result of this is that the incoming wave appears to be linearly polarized and looks as another plain wave to the LNA.

by

Hugh G. Brand, CE (6Y5HB)

% Bradwell Limited

Curphey Place

Box 16, Kingston 10

Jamaica, West Indies

Hugh G. Brand pioneered TVRO reception in Jamaica (as well as a significant section of the Caribbean) by building his own TVRO antennas as early as 1980. Brand's background as a professional engineer equipped him to design massive five to seven meter antenna structures and support systems of exceptional surface accuracy. His firm is now providing antennas of suitable (large) size for use throughout the Caribbean and Central America, including Mexico. Favorable tariff policies now in effect create significant cost advantages for antenna systems made outside of the US and shipped within the Caribbean/Central American region. Brand gained his technical knowledge largely from US sources, but his designs and applications are based upon the unique requirements of his region of the world. This is a multiple part series which began in our November 15th edition of CSD.

Correspondence

CSD provides this industry Forum with the understanding that opinions, thoughts and "facts" published are from the writers; no liability for statements extends to the publishers. Address letters to CSD/Industry, P.O. Box 100858, Ft. Lauderdale, FL 33310.

WON't Work

I watch Coop virtually every Thursday night on BORESIGHT and find the issues discussed very informative. However, I do not see much merit in the concept sent to you by a listener regarding free viewing of scrambled signals to those who live where cable is not available. For instance, our city cable only has HBO and Cinemax available as pay options and I rarely watch either. I do, however, favor other premium channels that are available (on satellite). So what good would it do me to pay for HBO if I want to watch a movie on Showtime? Can you explain to me how I would benefit unless a small fee covered the entire pay cable package, a situation which does not appear likely to happen?

I think cable programmers have never taken into consideration the difference between the residential user and the commercial user. HBO 'et al' are saying that the hotels, bars, and so on are making money from something they are getting for free (ie. 'stealing' HBO from satellite, via private dishes). This is probably true, since hotels do use the lure of television programming to attract customers. Bars and lounges, prior to television, paid big money for live entertainment to attract customers. Any dish owner who is making money from his dish service should, in fact, pay for that service.

But what about the home viewer? He is certainly receiving no income from the use of his satellite receiver. Why should he be charged the same as a commercial user? I believe business and residential users should be charged a permit fee; perhaps \$1 for the residence and \$100 for the commercial user. The assumption here is that both have their own dishes. Descramblers could be sold over the counter, with the user being identified for his intended use.

I would like to end on a lower note. The satellite equipment manufacturers, distributors, and related interests, including the publications, seem hell-bent on a collision course. Their theme seems to be to push as much as you can before it all ends; to sell as much equipment before scrambling takes over and the bubble bursts. I fear this mentality. I fear that cable will survive but dishes ultimately will become the same sort of relics which we have remaining from the 60s—fall-out shelters in backyards. I hate this prediction as much as you do, but within ten years there will be as many dishes in junk yards as we now see in the backyards.

Wally Hamilton
Battle Creek, Michigan

The BORESIGHT commentary by Coop responded to a viewer who had suggested that where cable service is available, dish owners should pay a fee for premium channels, but only if the local cable firm was carrying the premium channels. A cable system carrying HBO and Cinemax but not Showtime and The Movie Channel would collect, directly, from dish owners in its service area. The beauty of the plan was that no scrambling would be required (See CSD, November 15, 1985). The concept, like many, had merit and was worth discussion. However, it probably would not fly simply because the encryptors seem "hell bent" on encrypting now that so many millions have been

poured into the scrambling equipment program. Large wheels, set into motion, are virtually impossible to stop.

There is a strange business mentality concerning 'commercial users'. A single home, subscribing to HBO, might pay \$9 a month for the service. A hotel, with 100 rooms, subscribing to cable, pays a much lower fee—often as low as \$6 or less per room, per month for cable service. But if the hotel installs its own dish, and orders service directly from HBO (ie, Holiday Inns), it pays closer to \$4 per room, per month. This is HBO's policy and it says that those who provide their own receiving systems and who bypass (with HBO's permission) the local cable distributor save money by doing so. This flies in the face of HBO's announced policy of charging home TVRO owners \$12.95 per month when cable subscribers to the same service pay \$9 (give or take a dollar) and there is a middleman between HBO and the cable subscriber but none between HBO and the dish subscriber. Yes, legislation is clearly required here.

Ku-Band EIRPS

There has been much reported about Ku-band activity in recent months and I would appreciate seeing a set of EIRP maps for the new Ku-band satellites published in **CSD**. Here in Alabama, I have been doing some experimentation with Ku and found the only worthwhile video is presently on SBS-3. However, I am also interested in audio and data and believe many of your readers would find the EIRPs useful for the non-video birds as well.

While I have your attention, I would like to note that over the years, I have always considered Coop to be very professional in his work. So how can he continue to be associated with those idiots on BORESIGHT? I just do not understand how Coop can be associated with this program. I consider it to be the most assinine show in the history of satellite television. Coop just does not fit in with such a childish bunch.

Virgil L. Mitchell
Birmingham, Alabama

Ku-band maps, when we have RCA's Ku 2 and 1 (in that launch order) in orbit will be forthcoming. The SBS-3 services, primarily NBC feeds and some independent news groups, are of interest but they are also of marginal value. The more recent Holiday Inn feeds on GTE are of greater temporary interest, but they will be scrambled according to HI and Scientific Atlanta. Reviews are mixed on BORESIGHT. It is not television 'from the old mold', certainly. And many people are uncomfortable when an old trusted instrument, such as the family TV set, says and does things which on occasion offend. Some of what one sees and hears on BORESIGHT does offend some of the people

Industry At Large

some of the time. But a great deal of what BORESIGHT reports is excellent video journalism produced by people who are learning more about their craft with each week's program. We think they deserve ongoing support, because they are filling a need. They deserve censure when they screw up and most of all, they deserve praise when they do something really good. Tell them what you like and don't like, directly; it does have an impact on their thinking.

BREATHING Easier

When I read in CSD that Coop had 'farmed out' the production of the Digest, I felt sort of like the family dog had died. Now, after reading the latest issues, I feel the Digest is going to stay pretty much the same. Thank you.

Regarding scrambling; sometimes a subtle approach is best, especially when a dealer is trying to explain (and answer questions) to a prospective TVRO customer. I simply smile when I am asked about scrambling and respond "Well, if you own stock in Cox Cable, I suggest that you sell it soon." I happen to agree with Coop; cable is an interim technology and sooner or later it will be about as useful as a buggy whip. I also have a question regarding the M/A-Com scrambling system. How would it work if you videotaped the incoming signal complete with the individual address and so on, and then feed the taped program back into your descrambler somehow? If you paid one time, but stopped the service and you had your address 'on tape', could you not simply use the taped approval code to turn your unit on thereafter and avoid paying forever?

Ellsworth O. Johnson
E.M. Johnson Electronics
Spokane, Washington

Perhaps. But not with a videotape machine, we suspect. Home VCR units require reasonably pure sync to record at all. The sync in the scrambled signal is purposefully distorted and the net result should be (although we have not tried this) either no videotape or such a poor recording that the information placed on tape is no longer a mirror image of the original transmission received. With all of cable's security problems (employees helping individuals hook up for a flat fee of \$100, et al), how about this scenario: somebody at the command post (operated by M/A-Com for HBO) figures out that, for \$200 in his or her pocket, a friend's TVRO code can be entered into the do-not-erase data stream. A one-time fee, paid to somebody at the uplink, to turn your decoder on for every service ever scrambled—forever. White collar theft at its high-technology best!

NOT Short

A short letter to thank Coop for giving the serious and legitimate TVRO dealer the big plug on BORESIGHT/ October 10th. It seems that the manufacturers and distributors, in their haste to find business and move products, have completely upset the applecart (as Coop said it) and left the legitimate dealers at the mercy of the market. As we all know, the market is a mess to begin with.

Yes, the backyard hack certainly does have an advantage, because he has not invested \$10,000 in service and installation equipment or a service facility. He has not hired technicians so he, of course, cannot send his technicians to the manufacturer for training. He contracts out work, and avoids paying taxes and probably avoids a business license. He only buys from his distributor when he has sold something, which means he is not really a part of the pipeline which is so important to the distributors and manufacturers. For months on end, he sells no systems because the weather is bad and when he does sell systems, he settles for beer money because he has no real overhead.

See Panasonic® Satellite Equipment at these Distributors:

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Home Satellite Systems/
Cable TV Supply Co., Inc.
Los Angeles, California
213-202-2746

Centennial
Yonkers, New York
914-476-2100

Consumer Satellite Systems Inc.
Noblesville, Indiana
317-845-4400

Echosphere Corporation
Englewood, Colorado
303-761-4782

High Frontier Distribution
Tempe, Arizona
602-966-9824

International Video
Communications Corporation
North Little Rock, Arkansas
800-643-5427 - Outside Arkansas
501-771-2800

Intercontinental
Products Corporation
Salt Lake City, Utah
800-525-5959

Kelgo International, Ltd.
Norcross, Georgia
404-447-9450

National Satellite Communications
Clifton Park, New York
518-383-2211

Recreational Sports & Imports, Inc.
Idaho Falls, Idaho
208-523-5721

Satellite Earth Stations East, Inc.
Marrion, Louisiana
800-762-2110

Satellite Engineering Group, Inc.
Kansas City, Missouri
816-921-1555

Satellite Receivers Ltd.
Green Bay, Wisconsin
414-432-5777

Satellite Reception Systems
Athens, Ohio
800-592-1956

Satellite Television Systems
Sandy Springs, South Carolina
803-261-8209

Satellite Video Services, Inc.
Catskill, New York
518-678-9581

SRC Industries
Ontario, Oregon
503-889-7261

Star-Com Distributing
Big Spring, Texas
915-263-7512

Startech, Inc.
Salem, Virginia
703-387-0062

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Serious dealers, such as ourselves, are starting to turn down service calls on systems purchased from closet jockeys. Or, if we do accept such service calls, we charge more in order to overcome the extra workload required to not only fix something, but to also re-do a poor or hastily done installation that was rotten from the beginning. These part-time dealers never charge enough to do the job right and, by short-cutting accepted and proven installation techniques to get the sale, the customer ends up paying more. The manufacturers and distributors must realize what is happening here; they must look beyond next week's cash flow to realize that if they are going to be in business years from now, they must do business with dealers who will also be in business years from now. In short, the dealers need to start doing business only with the distributors and manufacturers who are selective in their selling!

If a dealer does not have a legitimate storefront place of business, he does not have a state issued resale tax certificate, he does not have printed letterheads and business cards, he does not have a statement from his banker and a properly drawn P and L statement and a balance sheet—the distributors and manufacturers should refuse to sell to this person. Additionally, a dealer who bounces a check, refuses a COD shipment after requesting it, or sticks a manufacturer with an out-of-warranty 'warranty requested' repair should be warned that the next time this happens, that dealer will no longer be able to buy there. We can no longer coddle and encourage the people who are in and out of this business like you-know-what through a goose. The price we all pay for allowing such people to operate within our business is tremendous. They raise the price for all of us, and they detract from our supplier's available time, so we (the legitimate dealers) receive less time and less attention than we need.

I would also like to suggest that dealers refuse to accept for resale any equipment which is not supported by schematics. We have recently been stuck with covering manufacturer warranty periods when the manufacturers have gone out of business. This is especially difficult when we have no schematics. In the future, manufacturers or distributors who want our business or products will provide us with schematics or we will not handle the products. That's simple enough. If just a small percentage of the real dealers adopted this policy, in short order we would have as much attention being paid to service backup as we now seem to have devoted to sales contests!

Judy Showers
Carlisle Radio & TV Company
Carlisle, PA

Judy (and Bob) Showers have been active as TVRO dealers since 1980 and TV sales and service center operators since 1948. Their experience shows and the suggestions they make are worthy of discussion in the dealer community.

Not A Good Idea

The idea of transmitting satellite signals through the air from one terrestrial station to another is very attractive, indeed. There are areas around the country where this would prove to be very economical and, in some situations, the only practical way to distribute satellite programming to the paying public.

There is, however, a very substantial stumbling block to the retransmission of satellite signals or any other type of radio or RF signal. The governing body for communications in the US has very carefully established guidelines covering the radiation of any RF energy.

The FCC will not allow the spurious radiation of signals that are radio frequency in nature and are not from licensed stations operating within an approved FCC service. Additionally, any equipment that emits an RF radiation and is operating within the confines of an approved FCC service must be FCC type approved and be operated in a fashion consistent with the intent of the FCC guidelines.

This may sound like it just about covers the gamut of things you can do with a transmitter and, in fact, it does. The FCC, literally, has the power to regulate and police any activity that results in radiation—from operating a 100 KW broadcast station to making toast for breakfast. Yes, that's right, if your toaster was found to radiate an RF field of sufficient strength, it too could fall under the FCC guidelines.

The aspects of radiation that the FCC seeks to control include the power of the radiated signal, the type of emission (AM, FM, FSK, etc.), the amount of sideband radiation that occurs as a result of the fundamental being transmitted, the type of equipment that can be used, and, of course, the frequency.

The official titles for the services that fall in the frequency range of 450 to 950 MHz include the land mobile service, the meteorological satellite service, UHF television channels 14 through 69, radio location, and the fixed service. These services are both governmental and non-governmental in nature.

There are also areas in the frequency spectrum that can be used on an unlicensed basis, with some very definite restrictions. These include frequencies that are intended for use with remote devices, such as those found in garage door openers, and remote controlled toys. However, these are limited to a very low effective radiated power, and are very limited in bandwidth.

There are also some frequencies in the spectrum that are so far above the regular C-band as to be well beyond the reach of current consumer technology. These millimeter wave frequencies may prove to play an important role in the future of entertainment communications, but not for a long time.

I also know of work being done in the frequency range of two to three GHz that is aimed at compliance with the FCC regulations, but the drawbacks center around transmitting multiple channels that are essential to offering a saleable consumer product. The developers involved are all-too-aware of the implications of producing or even testing equipment that may cause harmful interference, and I am sure that they will address this aspect.

This brings us to the concept of taking the block downconverted signal from an LNB, amplifying it and then applying it to an antenna for retransmitting. Sounds great! The equipment is available, the technique is fairly well known, and it works. But what one must realize is that no matter what frequency you choose, you are talking about committing a very bad "no-no" in the eyes of the powers-that-be. The bandwidth of such a transmitted signal is terribly wide, covering not less than 500 MHz. With the techniques mentioned above, there is very little control of the signal and its products, and we are left without sophisticated testing to determine the effect on the other services. This is what the FCC is all about. It should not be looked on as a restrictive big brother squashing every attempt for original creativity, but as a duly appointed watchdog of the airways, with a sometimes impossible job—to make the use of air waves as efficient as is technically possible. The reason for this correspondence is to try and bring to light the reasons why no one should advocate this activity. It is truly in our best interests not to radiate signals that may possibly interfere with other licensed services. After all, it is a small world, and I feel that this kind of untested transmission represents world pollution.

Bob Compton
Bellevue, Washington

Radiating a signal without a license is certainly not legal. We feel, however, that there must be some accepted system which allows experimentation with new techniques and technologies if there is to be progress in electronic systems. The FCC does routinely allow experimental or developmental licenses for new, unusual technology and anyone who wants to play with serious testing of a through-the-air re-broadcast system should pursue this FCC licensing for such testing. Outside of the USA, or where local (national) rules do not prohibit such operations, the through-the-air systems extensively written about by CSD would be excellent techniques for rural regions now unserved by television.

Transponder Watch

HBO has suggested that TVRO trade and guide press publications are in boycott of its advertising. Premium service ads in numerous publications (including **CSD**) have been refused and HBO has complained to members of Congress that they are being prevented from carrying their message to consumers through trade guides in particular. HBO considers ads as informational designed to help TVRO consumers better understand complex issues involved in scrambling.

RCA will NOT launch SATCOM 6, the special version bird originally planned to carry six C-band spot beam transponders to Europe. RCA told FCC it has decided against special bird which would have carried potential to serve Europe and North America simultaneously because of unwarranted restrictions placed on international bird operations by FCC.

HEAVY insurance losses, more than \$3 in losses for each \$1 in premiums collected recently, in space insurance field, forcing launch services (NASA and Ariane) plus bird owners to reconsider how to protect against future losses. NASA has decided they will re-launch any bird at 1/2-off price if bird fails within 90 days of launch for any reason. If failure is caused by NASA during launch phase, re-launch will be free. Insurance carriers, meanwhile, are asking bird manufacturers to carry greater portion of overall burden.

FRENCH Telecom 1 bird, recently offered as transponder service for radio or TV broadcasters, has been withdrawn from marketplace as possible commercial entity. French gave no reason for unexpected decision.

ECHELON is new Scientific-Atlanta end-to-end secure satellite service for video, audio, data, any combination of the three.

560 TVRO licenses had been issued within UK through mid-October although most seem to be for demonstration purposes to retail-

ers or would-be retailers. Prices for non-assembled, not-installed 11/12 GHz terminals with antennas up to 1.8 meters in size have tumbled to around \$1600 (US) recently and UK industry is approximately where US industry was in late fall of 1979 and early months of 1980 in terms of overall recognition of TVRO. SMATV systems, meanwhile, have been slow to begin. Number of licenses may be slightly lower than number of terminals actually installed to date, but not by much. Cost of license is around \$16 (US).

ANIK-E system being planned will have a pair of dual band (C plus Ku) birds located at 104.5 and 117.5 west. C-band package would have 24 transponders, 36 MHz wide, broken up into dedicated spot-beam zones. C-band would be all-Canada in nature. Launch dates are in 1990.

NBC asking FCC for permission to install medium power Ku-band transmitters at present receive-only Ku-band antennas now in use by 160 NBC affiliates. Concept is that affiliates would be able to feed news and local coverage material back to NBC directly using system.

ARIANE, after losing two expensive satellites in launch mishap September 12th, is now scheduled to try next launch January 11th with follow-on launch February 14. February launch would place Brasilsat 2 and Gstar 2 in orbit.

ECS-4, replacement bird for ECS-3 launch lost in September aboard Ariane, will be ready for launch no sooner than April. ECS-3 was to have provided additional television relay transponders for growing European cable/SMATV marketplace. ECS-4, originally an on-ground spare, will perform same duties when operational.

PLYMOUTH, Michigan, state district court has ruled that home TVRO owner in Canton Township cannot be prevented from placing TVRO dish on property in location chosen by consumer. Township

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Transponder Watch

had charged viewer with violating setback rules. Court found access to media or First Amendment Rights important in case holding "dish antennas provide users with unique ability to receive scores of programming services.... some of which are not available by any other means...."

HUGHES Aircraft will use Shuttle to launch six new satellites between 1987 and 1990. Contract to NASA includes pair of Japanese satellites which Hughes will co-own with C. Itoh and other Japanese partners.

INTELSAT management still not clear on how to reprice satellite route charges. Recent meetings focused on route by route pricing so international carrier could remain competitive with recently approved US based international carriers.

TURNER'S CNN confusing European marketplace. Turner is not offering service to cable, and has signed agreement with European Broadcast Union which expressly prohibits his serving cable systems with European feed. Efforts are directed at hotels and SMATV systems only at this point and many in Europe are puzzled by his low-key approach.

FM broadcast station subcarriers are now in use at approximately 50 FM stations nationwide to extend radio paging service to national coverage. Subscribers to system can be beeped via interconnect operating on narrow band carrier sent via Westar 4. DiversiCom is operator of system.

THOMSON-CSF reiterating its finding that failure of Japanese BS-2A satellite 100 watt TWTA transmitting tubes not Thomson-CSF fault. French firm claims extensive testing pinpoints twin TWTA failures to overheating of element in TWTA tube but disclaims responsibility suggesting strongly that some failure in (GE built) power supply providing power to tube element was culprit. Firm has suffered considerable poor press as a result of failure, and loss in turn knocked Japanese out of early-start-up Ku-band receiver business by removing two of three important channels in service.

WESTAR 2, at 79 west, will be more than 12 years old and presumably still operating when it is replaced by Westar 6-S around March 1st. Original 6 bird was lost in launch mishap.

LAUX Communications, Cincinnati based TVRO firm is being purchased by old-line satellite antenna firm Radiation Systems (Sterling, Virginia). Laux has been consistent manufacturer of TVRO antennas since 1981. RS, largely in heavy commercial and government contract field, reported annual sales of \$7.3 million in most recent quarter of year.

LATEST US birds to be approved by Intelsat for direct service to various Caribbean and Latin American countries include Telstar 302, ASC II, Spacenet III and RCA K(u)-1. Intelsat also approved use of Russian Gorizont 7 bird (14 west) by selected US news groups such as CNN. **FCC** had approved both items months ago.

RCA Ku-1, due in test as you read this, should have EIRP of at least 46 dBw over all 48 states. NBC is taking 8 of 16 transponders, AT&T a pair, 4 to Hubbard broadcasting for station program packaging and two will be left in reserve. NBC feeds from SBS-3 will be dual fed on both birds for a several month period.

RCA may be supplier for independent 16 transponder bird scheduled now for launch by Luxembourg group in the spring of 1987. The bird will be located at 19 west operating in the 11.2 to 11.45 GHz band with a boresight EIRP in the 48-50 dBw region (covering western Europe). TV programming will occupy most of transponders and system has been highly controversial because it will compete with joint ECS project backed by European governments.

INTELSAT head has joined list of noteables who predict non-dish flat phased arrays for TVRO receive applications in the future. Antenna technology is in use in radar systems and planners see eventual technical breakthrough which will allow such antennas to be mass produced at very low cost and mounted directly into roofs of buildings as a part of the roofing structure.

\$100,000 will buy you a complete Ku-band uplink plus downlink

from Hubbard Broadcasting group Conus Communications. Company offering TV stations package to allow stations to not only receive, but retransmit feeds via SBS-3 or RCA Ku-1 birds.

TELESAT in Canada offering fulltime radio network spot on ANIK for \$40,000 annual fee. Users buying service would feed into ANIK at either Vancouver, St. John's, Ottawa or Quebec City and create instant radio network covering all of Canada and much of USA.

PBS spending more than \$1.5 million with Radiation Systems to upgrade some of their transmit antenna systems in anticipation of forthcoming FCC 2 degree spacing requirements.

Ku-1 satellite will feature electronic mailbox where remote TV crews can check in with their uplinks operational and receive instant downloading of any mail or messages which may have been filed for their use. System will allow users to check in as able to verify latest instructions without full-time attended uplink at other end.

CLAIMING 750,000 distributors nationwide, AMWAY Corporation is distributing 6 foot dish (Winegard, typically) with SpaceVision (75 degree, 50 dB gain) and MSE (75 degree, 40 dB gain) LNAs, and receivers from Sat-Tec and others for a suggested retail price of \$999.99. The package was tested in various US locations and is approved for resale and use in all but far Northeast and southern Florida. Options include larger dishes and motorized controls. Customers will have six day turnaround product back-up warranty.

USA NET joins other popular services on January 1, (TR1) Galaxy 1. USA will continue to feed on TR9 of F3R as well and will time-zone split with west coast on F3R and east coast on Galaxy 1. Eternal Word TV Network has also moved, from TR18 to TR12 of F3R.

EUROPEAN broadcasters who are cooperating with Turner by providing exchanged news feeds to Turner are concerned that feeds they send to Turner are coming back into Europe as CNN material. Broadcasters are wary, in Europe, of impact of CNN service there and while Turner has joined European Broadcast Union as associate member, his American roots are viewed with considerable suspicion.

MIXED Chinese signals confusing as to status of first Chinese DBS bird. Most recent reports suggest late 1987 launch although Chinese terminated discussions with American and European satellite builders several months ago amid reports that Chinese think they are now capable of handling construction and design themselves. Other recent announcements; Tibet now has first TVRO connection to experimental Chinese 4 GHz (single channel) bird, and, China expects to build internally some 30,000 terminals for use in 1987 system.

M/A-Com has \$30M contract with Geostar to design and develop remote location system which will allow cars, trucks, box cars (et al) to be pinpointed from space using Gstar satellite. First units to be delivered in mid-1986.

SELECTV is now being uplinked by Wold Communications under new three year agreement. SelecTV is the only premium service programmer to show interest in serving home TVRO marketplace at reasonable monthly rate to date.

CommTek Publishing planning SPACE TODAY free-circulation business newspaper for TVRO and other space related trades early in 1986. English space reporter Jonathon Miller, formerly editor of Satellite Week, will be in charge of operation.

NASA and Young Astronaut Program will team up so that Mission 51-L, with teacher on board, can teach directly into classrooms all over USA.

EUROPEAN cable TV programmers, trying to provide stereo, locked in government debates over which stereo system to use. Dutch government has conditioned free use of satellite programs from ECS by Dutch cable system on programmer willingness to use Wegener Panda 2 system. Services using alternate audio systems will simply not be approved for cable carriage.

REPORT predicts some 600 plus video (TV) transponders in use within the Atlantic Basin by year 1995. Majority are likely to be serving North America, but basin area also includes those serving South America and Europe.



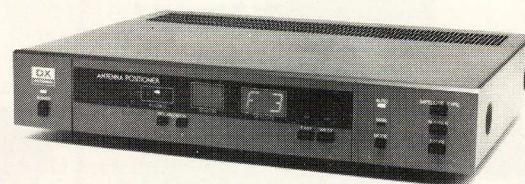
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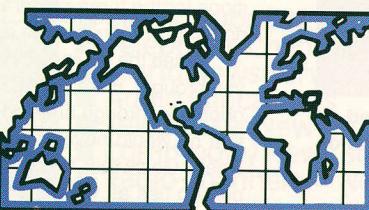
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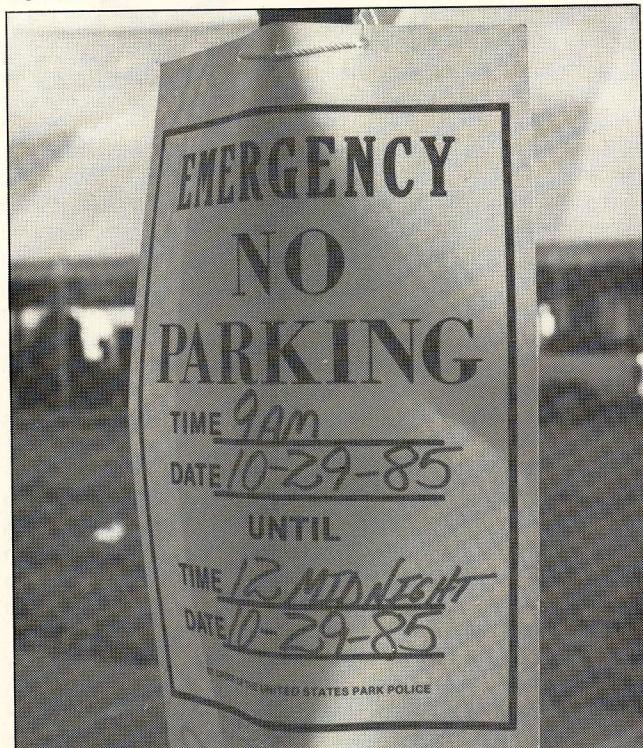
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Editor's View



CUE THE TALENT/ Mike Gustafson of STV Magazine (facing camera) records an introduction to the day's activities the prior evening, from the mall in front of the Capitol.



EMERGENCY/ Well, that's what the signs said that cleared all general parking from the region around the Mall so Earth Station Day could happen.

was now becoming known as 'the project.'

"I told them (them is a euphemism for Hewitt, Brown and Taylor Howard) I would be totally responsible for the uplink coverage that I had to have a completely free hand to do it my way," related Behar. This was in response to my asking him how he expected to get people like Shaun Kenny involved in the project, given the animosity that existed between BORESIGHT and SPACE. "Do you want to use the people from Boresight?" Bob asked me. I said I wanted to use every print and broadcast journalist and camera person we had in the industry. Everyone. "Then that's how it will work," he pledged. I glanced at Chris Schultheiss. Chris was rolling his eyes back in his head.

"You remember when you did something dumb like this?" smiled Behar. He was referring to the 1978 three-day-scheduled 20 hour uplink I pulled off during a cable TV show. That was the first time I ever

met Bob Behar. He came to find out about small TVROs and that makes Bob the earliest guy in our present industry to get tuned into TVRO, other than Tay Howard and Jim Vines. I remembered. And a cold sweat broke out on my forehead as I recalled the way we pulled that one off. I suggested that I was not anxious to have a re-run of that event again.

I spent the next week in the islands, helping Marshall hang amplifiers and balancing 'plant' on Provo's new cable TV system. That left Bob Behar to sort out the details. I did find time to dig through some videotape from our industry's early days in case we needed to fill time.

"My biggest concern is that we will not have enough material to fill the entire 14 hours," said a concerned Behar when I returned to the states just days ahead of the planned event. I asked him what his next biggest concern was. "Well, I suddenly have a whole group of bosses. They (another euphemism for the SPACE hierarchy) have suddenly decided that the telecast could be an important part of this event and they want to take over the telecast hosting." That sounded to me like my original concept of having industry journalists do the reporting and on-the-air hosting was lost.

"Well, your idea of you and Karen (Howes of Boresight) co-anchoring the telecast is dead. They want Robyn (Nierert) and Chuck (Hewitt) to do in-depth interviews." I mumbled something about amateurs and shoved the whole project out of my mind. Chris brought it back to the forefront again.

"I don't like it either but I think we should be prepared to bail them out; you know, fools tread where angels fear to go sort of thing...." I had more important things on my mind like long-held plans to pick up a vintage 1960 Corvette in south Florida and drive it north 1,000 miles to its new home. I was planning to do that the weekend prior to the ESD gathering and that would place me just outside of Washington the day before the set-up began. I concentrated on getting the old Corvette checked out for the dash north and left the intramural battling of who would control the uplink to others.

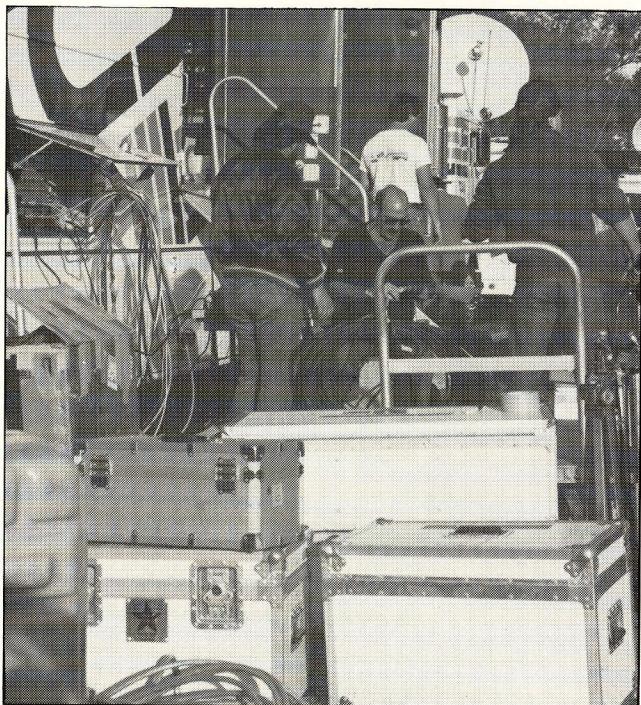
I arrived on the Mall, as I had promised Behar, at noon on the 28th—I found him up to his neck in alligators. Actually, there were no alligators there but he did have three stages under construction, a half dozen studio cameras, and their associated electronics spread all over the (in)famous Mall — there was probably ten miles of wire stretched from one end of DC to the other. He was trying to make all of the pieces fit.

"Tell those people how to arrange the set," he barked, "and when you finish that, go out on the Mall and help them select the three positions for the three cameras there." I had a busy afternoon but it was nothing compared to the pace Behar was keeping up.

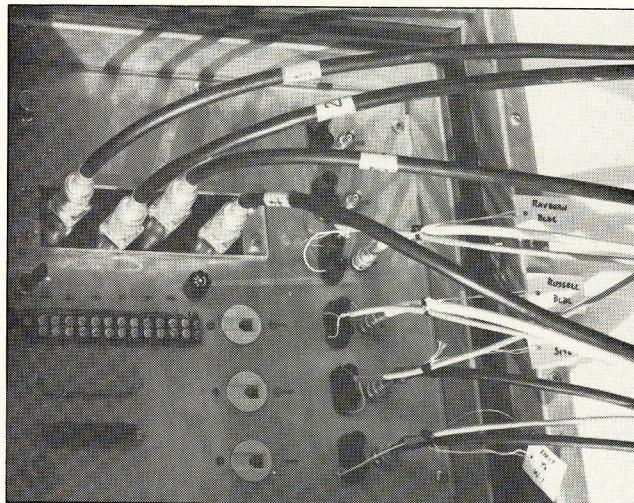
"When the equipment is set up, you and I can edit through the tape you brought. Here, SPACE gave me this batch of videotape this afternoon. Go through and find where Ted Turner promised us in Orlando that he would never charge outrageous prices for his services, and where Goldwater told us that everything that falls in our backyard is ours to use as we please...." and he disappeared around a tractor-trailer loaded with electronics. I spent several hours foraging through videotape records of our industry, extracting the pieces which best illustrated or amplified what we were all about. Then we stacked them up on a one inch master tape ready for instant on-air use as the ESD activities unfolded.

By late in the afternoon, it was apparent to me that we were going to need every industry journalist we had available. Behar agreed. We started an assignment sheet and tried to work out who would cover what, when and where. The concept was as follows:

1) On the hill, two separate remote sites had been built—one within the primary Senate Office Building and another within the primary House Office Building. Various journalists were assigned to these sites, and their job was to find and interview Senators, Congressmen, aides, and members of our industry at these sub-studio sites. The two



40 FOOT OF ELECTRONICS/ TCS (from Pittsburgh) van, normally in service for professional football games on weekends, was the master control and production facility parked on the Mall; a complete television 'network' on wheels.



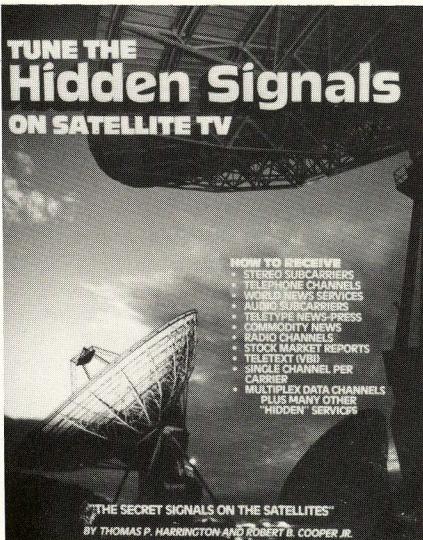
OUTWARD BOUND/ The video from the van went on hardwire across Washington to the Bonneville uplink site on the edge of town. Don't ask how much it cost to arrange the video line link to the uplink.

sites were inter-connected to the primary production van via 2 GHz microwave over paths of less than a mile.

2) Out on the mall, three cameras were set up to cover the opening events; various Congressmen and SPACE officials would speak to the assembled crowd from a platform built for the occasion. All three of those cameras were hard-wired directly back to the production van.

3) Adjacent to the production van, in one corner of a massive tent erected to protect participants from nasty weather, (we would have fair

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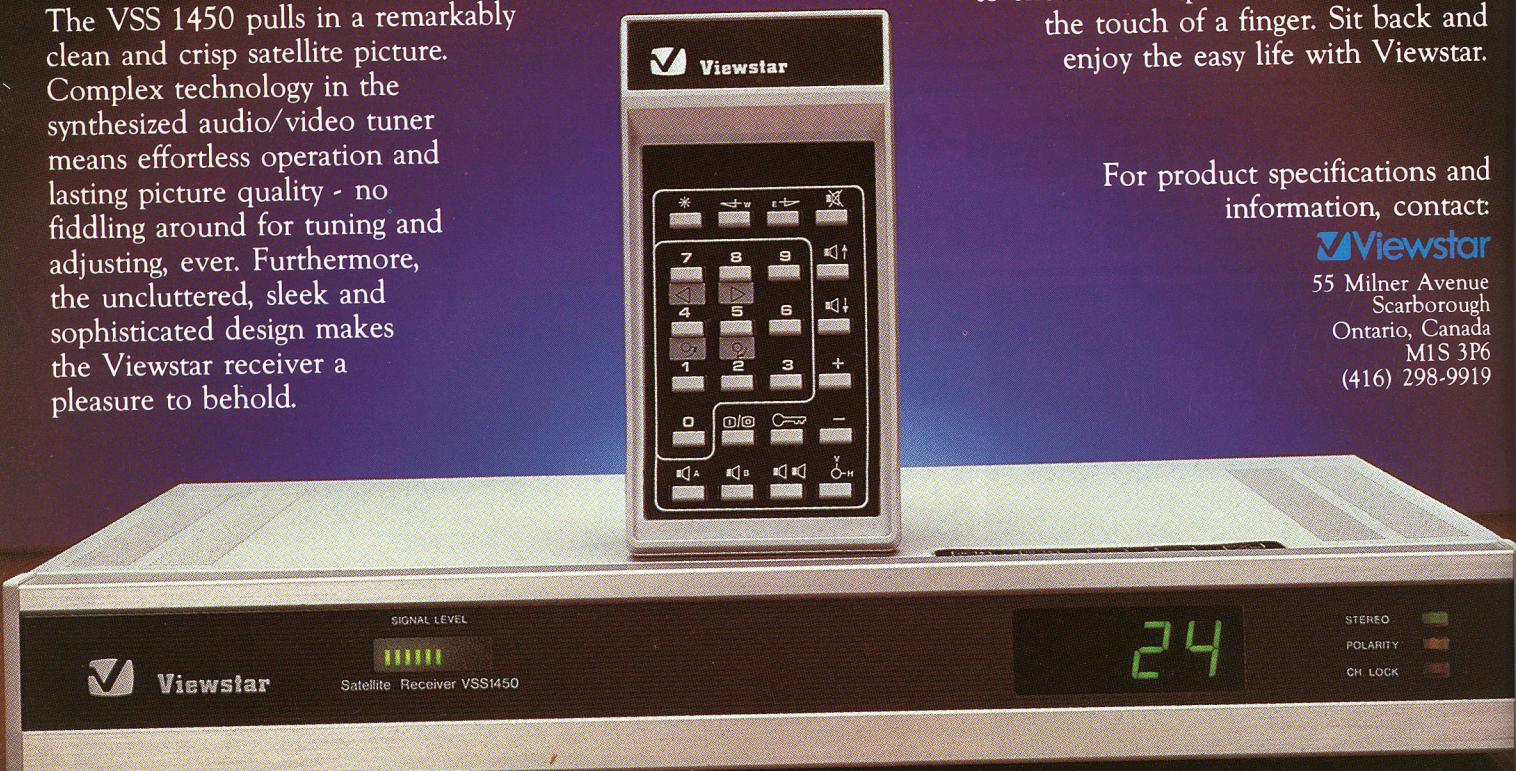
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WRAP-UP/ Hewitt (left), Counsel Brown, Chairman Howard and co-Counsel Robyn Nietert close out the first portion of the live telecast at 4:30 PM.

weather as it turned out, but it was close!) was another tent-enclosed studio. Two permanent studio cameras were installed there and they also were hard wired back to the van.

4) Immediately outside of the van, yet another camera position was established for on-grounds interviews and coverage of the day's events.

The production van was internally broken into three parts; a video tape editing and production bay, an audio production bay and a control room. In the control room, several dozen monitors filled a wall and Behar and the head of the van crew would select which video and which audio sources they wanted to keep the program rolling along. One fellow would spend all of the 28th loading a machine called a Chyron with several hundred pages of names, lists and so on for the visual super effects which would be available on request to grace the screen. SPACE's Carole Sutter would end up being an important part of keeping the right title affixed over the right person's image as the day wore on.

"I want a dress rehearsal at 7:30 AM," commanded Behar as the crew finally knocked off at around 10 PM after buttoning up the last of the cable connections and checking out the last of the videotape inserts we would have available. Behar's job on Tuesday was simple enough; make 14 hours of live television come off flawlessly, keep it fast paced and moving so viewer interest would not be lost, and make approximately 50 people who had never worked together previously (indeed, many had never worked in the video medium at all, previously) somehow pull together towards a common goal.

My own faith in Behar pulling it off had been so thin that I had neglected to make room reservations in Washington for the night. So I headed back across the 14th street bridge into Virginia to look for a place to stay. I would regret that decision the following morning as I shuttled along at a snail's pace and arrived back at the Mall barely five minutes before the scheduled air time. I was still not certain how, or where, I would be used in the production. I trusted Bob explicitly, however, and he had me grab an anchor stool adjacent to Chuck Hewitt and Taylor Howard and before I knew it, we were on the air. And so the

big ESD uplink began.

Those who have seen the event, either partially or fully, will perhaps appreciate that I still have not as I write this report. I understand it looked very good out there in Kansas and Texas and California. We even got mail from Hawaii, and the Caribbean, and Central America. Being on transponder 5 of Galaxy 3 had its rewards, obviously. I will tell you this: everyone who participated, to the man and woman, put forth a 100% effort. Special praise has to go to Robyn Nietert who did an excellent job of co-anchoring the majority of the day, to Chris Schultheiss who showed us that a print journalist can handle video assignments with good style, and a long list of others including Pat Porter, Ron Hudson, Lloyd Covens and Pat Olson. Those names missing here did no less, it was simply that a few people really came across especially well with minimal training and minimal previous experience. As Pat Porter would later remark, "There will never be another day like this one!" There were tears in his eyes as he said it.

The original plan was for the live coverage to wrap between 9 AM and 3 PM, with one inch tape recording those six hours. Then we'd repeat the six hours between 3 PM and 9 PM and come back with a two-hour wrap-up, using videotaped highlights of the day and live call-ins to give those thousands out there the opportunity to participate. The plan got changed as the live coverage dragged to 4:30 PM and Bob Behar decided that he needed more than two hours to properly wrap-up the day's activities. So we went back on the air live again at around 7:30 PM and the call-in portion started at 10 PM.

There were just under 200 TVRO antennas set up at the mall (although a truck load from Birdview would be available if we needed more to set up). The cable trade press reported we had 400 people there but the cable trade press either lies a lot or has not yet learned how to count. I'd say we had to have at least 1,500, minimum. Perhaps the most dramatic event of the day was the appearance of Congressman Tim Wirth (D, Co.) who announced that his subcommittee on telecommunications in the House would hold hearings 'In January.' Here's what is significant about that.



CAKE CUTTING/ In celebration of the industry's first anniversary as a legal entity, the day's events included cutting of a birthday cake.

TVRO has a pair of bills in the House hopper; bills dealing with scrambling. HBO is promising us they will begin full-time scrambling of their two services January 15th. Both of the House bills, if they are to receive serious consideration in 1986, will have to pass through the Wirth subcommittee first. Therefore, getting Wirth to agree to hold hearings, or in effect, study the two bills, is important.

There was some confusion about what the Wirth hearings will cover, however. After his speech on the Mall where he acted quite sympathetic to our plight, his office issued a 'clarification' wherein they explained that the hearings would be 'general' on a wide range of telecommunication subjects, and not merely dealing with the scrambling issues. Days later, they would re-clarify the clarification one more time backing even further from scrambling as an issue. Also in question is the time frame; it might not be (and probably will not be) January at all. "Perhaps during the first quarter," we were told.

So the impact of such hearings, if and when held, will not affect the HBO announced plan to begin scrambling on January 15th. There seems to be a feeling in Congress that they should allow the HBO scrambling trial to proceed, and then perhaps revisit the whole of the scrambling issue in, say April or May, after there has been an opportunity to evaluate how the system is working.

Cable interests are pushing for this approach, certain as they are that if HBO's scrambling proceeds on schedule, M/A-Com will be able to supply the relatively small number of descramblers required for at least the period of time until the next batch of services begins scrambling. Members of Congress are under intense pressure from both sides on this one—from cable people (who do make very significant contributions to political campaigns) and from the rank and file voters who in rural areas own TVROs and who feel crapped-upon in this situation. This is the classic political confrontation: big money versus votes. For right now, I'm betting big money will prevail for the next six months.

Was Earth Station Day worth-the-effort? No question. It was. Should we ever do it again? Not unless we have the kind of reason we had this time; the need to (1) pull the whole industry together at one time on one project, and, (2) some reason to make this type of splash in Washington.

Did we learn anything? A bunch.

1) Buy up the satellite time either side of the actual telecast (David Wolford of Orbit Magazine bought the hour ahead of and the hour after

the telecast to run a graphic display which basically told the world that Orbit Magazine was 'responsible' for the Satellite Earth Station Day coverage; a non-truth but it went down OK if you read it fast);

2) Our print and broadcast media people can be trusted, despite some fears 'some' (that's the same euphemism again) held that we could not be trusted;

3) Bob Behar is a miracle worker and the next time an earth shattering world event requires instant, unrehearsed live television coverage, Behar should appear at the top of the list as 'producer' of record;

4) Robyn Nietert may be leaving our industry soon to take up a permanent spot with a major network as a morning news anchor;

5) Congressmen and senators love to be on television, almost as much as they like to count campaign checks;

6) TVRO dealers and dealerettes are the greatest people on the face of this earth and those hundreds who took several days out of their busy selling season to travel to Washington for ESD '85 will be able to point with great pride to their contribution in helping save our industry from the encryptors years hence;

7) And finally, I will probably not pick such an occasion to change my hairstyle in the future. The new image so badly distracted people I was trying to interview that they could not concentrate on my questions!

Update on Cable Activities

This has not been a banner year for the cable television industry. There have been a number of fiscal setbacks which tend to make the overall cable mood quite somber. A quick analysis might conclude that 'the rich are getting richer while the poor are getting poorer.' It is probably too early to pass out crying towels for our cable brethren, however.

Cable penetration inside big city markets has continued to be a disappointment. Cable firms had anticipated certain revenue streams from their big city system builds (such as Dallas and Pittsburgh) and those revenue streams have been significantly smaller than anticipated. In Boston, for example, the big time operator there has been virtually giving away basic cable for a couple of bucks per month. They figured that nearly 100% would go for the low fee and then once they had the first cable-basic channels, people would opt for the more expensive optional services such as HBO. It didn't work out that way and the Boston franchisee is now asking the city if it can restructure both services offered and charges before it goes belly up. Boston's problem is not unique.

One of the cooperative efforts attempted during 1985 to turn around cable's success ratios in big city markets was to create a national, industry-wide advertising program. They called it CCI for 'Council For Cable Information' and with a budget of nearly \$12M, CCI sponsored national radio network, billboard, sign boards, and other advertising designed to motivate people to take cable TV service. The program didn't go very well, in spite of the big dollars spent and now we see some of the major MSOs such as TCI opting not to fund the CCI approach for another year. There is a message here; if the best cable operators, armed with twelve million bucks, using the best advertising minds available in the USA could not get their money's worth out of a well planned and well coordinated advertising campaign, what are our chances of doing any better in the home TVRO field? Yes, I get bad vibrations about SPACE somehow coordinating the expenditure of several million bucks to make the average man in the street more aware of home TVRO.

With big-city cable stunted and cable growth slowing down at an unexpected pace, there have been repercussions in many allied industries. Cable and cable plant hardware in particular. For more than a decade now, cable plant construction has ripped along at a record pace. It takes a lot of cable, amplifiers, and passives to wire up Dallas (for example) and the firms making this kind of equipment have done right well through all of this. M/A-Com's cable division (originally called

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CommScope), for example, has made major profit-dollar contributions to corporate M/A-Com because of the growth of cable TV plant construction. But with most big cities now wired or being wired, there is a big dip starting in new hardware purchases. Some of the cable supplier firms, such as Texscan, are hurting badly.

Just one year ago, Texscan was making a run at TVRO supplier Intersat. The Missouri firm was, it would turn out, in severe financial straits on its own and it needed the dollar backing of a firm which had the kind of manufacturing expertise and dollar reserves which could bail Intersat out. Texscan kept up the romance for several crucial months last fall, just long enough for Intersat to reach the point where it was probably too late for Intersat to be rescued by anyone other than Texscan. Then somebody at Texscan apparently noticed that they, too, were out of money. Intersat went down the tubes and Texscan, a year later, is not far behind. It's hard to imagine a firm the size of Texscan, doing hundreds of millions in business per year, flipping to a fire sale situation in just over 12 months.

TVRO firms offer an attractive after-CATV-market for many of the cable firms in the hardware business. Unfortunately, the cable industry is not very understanding when a cable hardware supplier tries to play both ends of the street. That's that old 'TVRO is the enemy' plot again. M/A-Com is a good example of a firm that has never been fondly viewed by most of the cable people; first because M/A-Com was heavily into broadcast television back when cable viewed broadcasters as the enemy and more recently because M/A-Com is heavily involved in TVRO and now we are the enemy. Still, there are some good and even excellent TVRO firms for sale these days and with TVRO hardware growing at a percentage rate that is almost identical to cable's hardware rate falling off, I think we can look forward to seeing more cable hardware firms buying into TVRO during 1986.

Perhaps the most troubling aspect of cable's fall of '85 is the uneven performance of the premium services in the consumer marketplace. HBO and Showtime growth has stagnated; even fallen backwards in some markets. At the same time, the audience measurement firms are finding growing audiences for some of the advertiser supported basic services such as USA and WTBS. Even ESPN, narrow casting as it does, is attracting sizeable audience numbers and consequently better advertising revenues. ABC, the owner of ESPN, reported the sports network made profit dollars in the most recent quarter. That's significant.

The cable brain-trusters have just about decided that given the FCC's decisions, Congressional actions and court decisions of the past 12 months, cable's picture is likely to change dramatically over the next 3 years. They forecast that cable's fees for basic service will increase while fees for specialized services such as HBO will decline. They also anticipate that a new tier of movie releases will be created, someplace between the present 'theater movie time window' and the present premium service time window. Movies will be sold in this early-release-for-television period on a per-view (pay per view) basis at so much per movie rather than the present lump monthly fee for bunches of movies (ie. HBO format).

The PPV movies will be distributed via satellite, probably in a scrambled format, and cable subscribers will be charged or they will pre-pay each time they select such a movie offering. The hardware to do all of this economically is only in a relatively small number of cable homes at the present time, but addressable cable converters are coming on rapidly and ultimately all but the smallest systems will be so equipped.

It is my feeling that when there are sufficient numbers of addressable cable converters in place, we'll see most of the class movies showing up only on PPV services first and the HBO type formats with a lump fee for lots of movies will slowly become purveyors of older movies. At that point, somebody such as Turner will be able to take his (MGM) library of films and package an advertiser supported older movie service. And that will wipe out the HBO format services in short order.

since people will no longer be willing to pay \$4 to \$10 a month to get movies only marginally different that Turner (or somebody like him) offers free with advertising thrown in.

All of this revolves around the growth of addressable converters and cable system willingness to install these \$100 boxes in each subscriber home. I'd give it five years to mature at this point, but as it does, the satellite feeds which nurture these evolutionary services will themselves change and adapt to the new marketplace.

So while we look upon cable as a foe and we concentrate on how they are attacking us and getting in the way of our internal growth, cable has its own growing and maturing problems as well. We represent a significant threat to their future but we are hardly the only problem they face in the balance of the 80s.

Dealer Beware

Early this year a series of advertisements cropped up offering a small box which claimed that it was a 'wireless TV transmitter'; a gadget which would allow a TVRO user to transmit the output of his or her satellite TV receiver (VCR, et al) throughout the home without wires. The price was apparently right/ \$35.00 or so to provide house-wide coverage. It is certainly cheaper than wires.

I figured the ads would last a month or two and then the FCC would shut these people down since such transmitters are illegal. The FCC is apparently busy with other activities right now and they haven't done a thing as far as I can tell.

The concept of having your own in-house transmitter is great. That's my kind of gadget. I guess it was 1951 or so that I built the first one I ever had. When I connected it to an outside TV antenna, I could reach out a half mile or so. Since I had it connected to a huge, wire, rhombic TV antenna for reception, I was very popular with the neighbors since I was sharing the TV reception from my huge antenna with them. A local TV shop that was losing the sale of large TV antennas in my neighborhood pointed out to me that my low power transmitter was illegal and they advised me to turn it off. Actually, they didn't advise me. They said, "Turn it off or we are going to report you to the FCC." I turned it off.

Nobody has yet turned off the Las Vegas, Nevada, firm that is offering one of the more popular units out there. They sell it to TVRO dealers and others for \$35 (UPS charges prepaid), and then suggest a retail price as high as \$89.50. If I were a dealer, I'd love to stick \$54.50 in my pocket each time I sold a \$35 gadget.

The FCC does allow unlicensed transmitters in very special bands or on specific frequencies and then only with restricted forms of modulation. For example, they allow 100 milliwatt walkie-talkie units in a set of channels around 40 MHz. The manufacturers who sell units for this service must submit their units to the FCC's Laurel, Maryland, offices for lab tests, or at least certify in writing (and on each unit) that the units meet all of the requirements of unlicensed service. In fact, every service such as this, allowing unlicensed operation, requires a permanent plate attached to the units sold which certifies that the units meet or exceed the applicable FCC rules. I suggest that you look on the wireless TV transmitters you are being offered for re-sale to locate such a plate stating that the units meet or exceed applicable FCC (XX; some number) rules and regulations. The unlicensed channels, frequencies or bands, are very narrow, and television requires a wide bandwidth. Therefore, without further study, you cannot simply 'A5/F5' (TV) modulate any low power transmitter in an unlicensed service. A careful study of the various FCC frequency assignments for unlicensed, type accepted or type-approved service would reveal that the lowest frequency band where such unlicensed operation is possible is around 10,525 MHz. That's 10.525 GHz and that's well up in the microwave region. Even there, the unit being sold must be FCC approved before it can be sold.

Most of the wireless TV transmitters now being offered operate around UHF TV channels 14 to 30 or so. There are several reasons why this range has been chosen, and none of them are legal:

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The Westplex portable microwave system is a budget priced FM link operating at 10.525 GHz. The system is capable of transmitting NTSC color video, plus an audio channel and an optional duplex phase or dataline. 40 miles are realistic using an optional 2 ft. dish at each unit. Other options include a remote RF head, AC/DC operation, 35 mw or 50 mw output.

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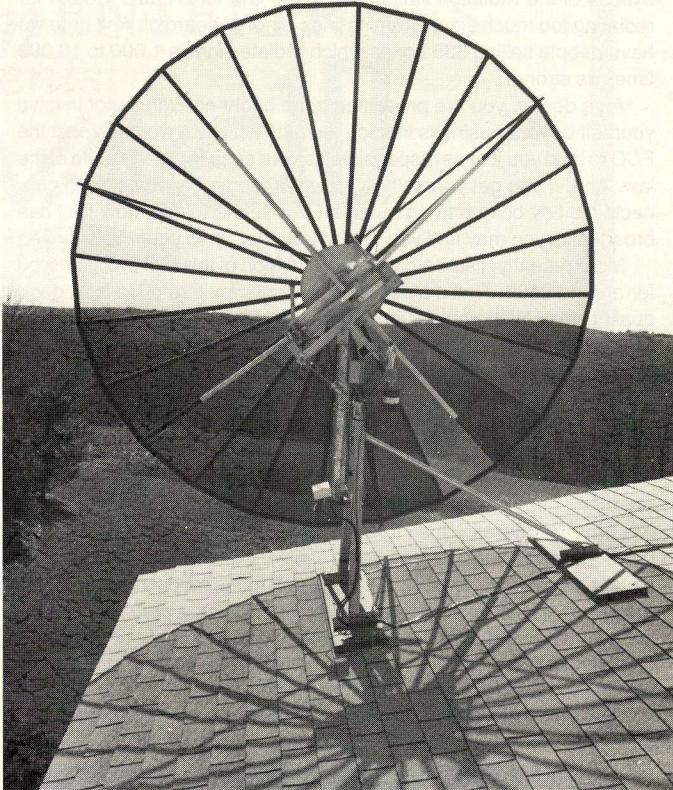
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1) Low power (5 to 25 milliwatt) amplifier chips are available for this frequency band, and they are very cheap.

2) VCR type modulators are built for this frequency range in the Far East, so if you take a VCR modulator and tack up a 10 milliwatt amplifier, you have an instant, cheap, wireless TV transmitter.

3) Being within the UHF TV range, the channel or frequency chosen is directly receivable on a standard TV set. That helps since the user does not need a special receiving converter.

The concept is good, the price is right, and there are probably tens of thousands of them now in use or in the pipeline. And they are all illegal.

FCC rules restrict radiation (signal transmission) to exceptionally low levels within the TV broadcast frequency ranges (ie. channels 2-6, 7-13, and 14-83). And for good reason. In normal terrestrial TV reception, a signal that is as much as 40 dB weaker than a TV signal you are trying to watch will cause 'co-channel interference' (lines) on the TV screen. In a fringe area, it is possible to get fairly decent color on a good TV set when the TV signal is 100 microvolts. That's the same as -20 dBmV in dB talk. That's 1 microvolt.

One of these 'wireless TV transmitters' with a small (supplied) whip antenna is capable of squirting a signal 1 microvolt strong over a range of a mile or so which simply means that these little boxes have the technical ability to interfere with other people's reception over a considerable distance.

The FCC is so concerned about interference to TV reception that they adopted radiation limits for cable television systems more than a decade ago. The limits are hard numbers, measured with dipole test antennas and sensitive signal level/field strength meters. The measurement sequence involved locating the test dipole antenna so many meters (in distance) from the cable TV lines and then reading the level of signal intercepted. The shorthand for all of this is a set of tables in microvolts-per-meter or, how much signal you measure so many meters/feet from a cable line. The bottom line is that for all practical purposes, if you can measure ANY signal at all, you are probably in violation of the law. Recently, a number of cable systems have been fined damages by the FCC when they were found radiating signals in excess of the radiation limits. A \$10,000 fine for a cable system for radiating too much signal from its lines is not unheard of. And here we have people selling \$35 boxes which radiate signals 1,000 to 10,000 times as strong!

As a dealer, you are presumed to be bright enough to not involve yourself or your business in such a shady activity. I would expect the FCC to hold you just as responsible as your supplier for violation of the law. And, if you get yourself an adventuresome consumer who connects his tiny box up to an outside TV antenna to 'see how far I can broadcast,' you may find you are in hot water up to your motor drive.

More recently, I saw a high power version of this box being offered for around \$600. That's a decent (if not outstanding) price for a good quality, three-watt transmitter. Ignorance of the law is not an admissible excuse here; a court will instantly assume that since you sell communications equipment, you are qualified to do so. And right on these boxes it says 'UHF Wireless TV Transmitter.' That is pretty plain and you'd have to prove you couldn't read or comprehend spoken English to plead ignorance.

From the original FCC ruling back on October 18, 1979, to the present time, our industry has been pretty much ignored by the FCC. The one time they did stick their nose in our business involved modulators, some 15 months ago. Many of our receiver OEMs were building modulators into receivers without insuring that those modulators met FCC requirements. Now, here we are again, indirectly perhaps, getting back into their turf. Our advice to dealers is to find some other way to share TVRO receiver pictures; the UHF Wireless TV Transmitters are not a safe way to go.

The Las Vegas firm offering UHF Wireless TV Transmitter has done a massive marketing effort for what is basically an illegal product.

Cable's Mishandled Scrambling

The concept of providing a singular type of scrambling system for universal use by all willing cable satellite programmers seemed very logical at the outset. Nobody, not even the most strident TVRO foes, really felt any good would result from there being two or more non-compatible scrambling systems. The VHS versus Beta wars of more than a decade serve as a very vivid reminder that two engineers who cannot agree do not necessarily make things 200% better for the consuming public. Suppose half of the USA had decided to adopt 220 volts and 50 cycles, and the other half had elected 110 volts and 60 cycles. Do you know what that might have done to the development of later generations of electronics?

Japan has that problem. I'll bet you were not aware that major portions of modern Japan use 50 cycles, while the rest utilize 60 cycles. This produces some very interesting, flickering, TV pictures in many areas of Japan, since the TV transmitters are synced to the 60 cycle sources while those people who live in 50 cycle areas have their TV sets synced to their local 50 cycle sources. VCRs that depend upon the local power to sync reference don't sync reference very well; clocks that depend upon 60 cycles run slowly on 50 cycles and on and on. Most of Europe uses 50 cycles, and when entire countries or regions are using 50 cycles, there is no intermixing problem of reference timing sources. It's only when we have two separate standards in something like this that we have problems. Japan has problems, and even today they seem unable to untangle the mess this has created. Similar problems, with two or more descrambler standards or systems, would haunt us in the TVRO world for decades to come. No, having two standards is not the answer.

Years ago, the American FCC had very strong feelings about establishing standards before a new technology started to produce large quantities of consumer products. The original US TV standards were established in the late 30s. They were largely RCA developed standards, and RCA used every trick in the book (including the Long Island World's Fair in 1938) to make their system the national system. Of late, a more liberal FCC has taken a different approach to standards—marketplace acceptance. After holding hearings and selecting standards for color television and UHF TV broadcasting in the 40s and 50s, the FCC has leaned in the other direction. AM stereo, for example, allows several systems to operate. The hapless consumer is stuck trying to decide which type of receiver to buy. As a consequence, most are not opting to buy any receiver (stereo AM) at all, because just as the consumers are confused, so too are the broadcasters who have to modify their equipment for AM stereo transmission.

The FCC, reluctant to adopt a single AM stereo technical standard, is not about to step into standardization of scrambling equipment for TVRO. Thus, we find ourselves facing a defacto standard. One established because of a lack of true competition in the hardware marketplace. And as with most defacto standards, we are dependent upon the integrity of the hardware developer and supplier to treat the marketplace fairly.

Some suggest that the defacto scrambling system supplier, M/A-Com, is not treating the marketplace fairly. There are those who feel the M/A-Com system is not technically adequate, either. Some of this is sour grapes; some of this is probably an accurate criticism of M/A-Com business ethics.

From our narrow view of cable, we tend to think of cable television suppliers in a monolithic manner. A giant, established, well-funded, single animal which moves all of its legs and arms in unison. The truth is quite the opposite. Cable is every bit as fragmented as TVRO, perhaps even more so. Quite recently, the cable industry has been through hard times. The strong players today were not necessarily the strong players of a decade or even half-decade ago. Power struggles, in the cable political machine and in the cable operating machine, are on-going and with far greater intensity (and much larger stakes) than within TVRO. Cable has shown an amazing ability, however, to rally

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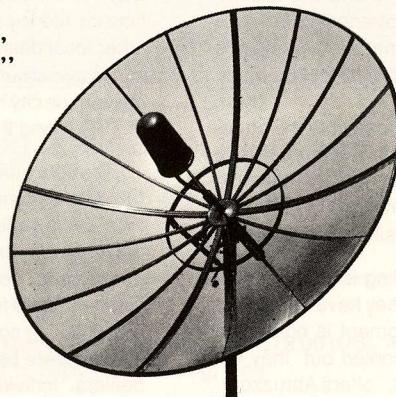
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around their own flag whenever their normally disjointed being is threatened or attacked from without. TVRO represents a kind of threat which causes cable to rally.

"We expect to be a major supplier of home TVRO systems," notes the President of one of the top 20 cable MSOs (multiple system operators), headquartered in Iowa. He was explaining why his MSO firm had agreed to order an initial supply of 3,000 home-style cable de-scramblers from M/A-Com.

"In the Pensacola market, we plan to have at least 55% of the home TVRO system market," says the manager of the local cable system. They are already test marketing home TVRO systems. Both M/A-Com and Scientific-Atlanta, suppliers to TVRO and to cable, are likely product lines to be sold by the Pensacola system.

"It is not my wish that cable operators sell TVRO systems," notes SPACE's new Dealer Board President Frank Abruzzo. "But it is probably inevitable and I don't see any way we can prevent it. That doesn't mean we won't try, but we have to be realists here. I do feel that if they (cable) are going to sell our hardware, we should be able to sell their software. That's the real battle for 1986. Nothing else will matter until that is resolved."

Abruzzo and other vocal dealers expect to see major off-shore suppliers working out distribution deals with major US cable MSOs during 1986. "Why would TCI or Heritage cable buy TVRO systems for resale from their local Jimmy Long or Echosphere store?" ponders Abruzzo. "They will deal directly with Kenwood or Uniden or Panasonic. They will contract for 10,000 or even 100,000 complete systems for the year and then spread those systems out over their 300 or 1,300 cable systems for re-sale. M/A-Com and S/A see this coming; they want a piece of that action. I've got news for them, though; TCI and other MSOs will use firms such as M/A-Com and S/A just long enough to test the marketplace and then they will go directly to the Far East. Why should they deal with an intermediary? M/A-Com buys their product in Japan; TCI will too."

Other dealers are concerned that as SPACE is forced to deal with these ever more complex issues during 1986, there is a lack of understanding, at the top, of marketing considerations.

"The problems we face today, as independent dealers who want to see our businesses grow, are marketing and sales related. Tell me who, at the top in SPACE, is even sensitive or conversant in the skills of marketing?" worries a New Jersey dealer. "I told my SPACE director that in October of last year, I sold 34 systems and this October I sold four. I'm in a near panic state because in spite of everything I know how to do, I am slowly starving to death. I have laid off my installation crews, reduced the office staff to include only my wife and I do my own selling, hole digging, concrete pouring and antenna assembly. I am hurting and I can't figure out what has happened here. I can't find anyone at SPACE who seems to understand that the marketplace has done a complete flip-flop for me and many other dealers in the past year."

The SPACE Dealer Board tried to bring this situation to the attention of the big board back to the Nashville show in September (see CSD/2 for September 15). They found a lack of sensitivity at the big board, where OEMs and distributors were experiencing the best sales year to date. The situation has only gotten worse since September.

"Cable TV has to see what a mess our retailing is in; cable has some very bright marketing people and I am sure they have figured out just how vulnerable the home TVRO dealer segment is right now. When they have their marketing strategies all worked out, they will walk in here and take us over by hardly firing a shot," offers Abruzzo.

Product pricing, as the year winds down, is indicating some major changes on the part of suppliers. Higher-end products, in particular, seem to be experiencing price erosion and/or marketing strategy change. Many see this as a prelude to the entry of major cable MSOs to the hardware selling end of the business during 1986.

Example: M/A-Com cut prices to distributors in mid-fall by 25%, fol-

lowed by reports of selective additional cuts. The distributors were being asked to sign significant purchase orders for products to be delivered prior to the 31st of December.

Example: Scientific-Atlanta, apparently finding some sales resistance to its first product line brought out this past summer, will be introducing a new receiver shortly after the first of the year. The receiver is reported to be virtually identical to one of the two M/A-Com models and is manufactured for S/A in Japan by the same firm that supplied M/A-Com.

Example: STS (St. Louis) held a series of by-invitation meetings in early November with key distributors. STS is planning a top to bottom shake-up of its distribution program for 1986, going to exclusive dealership arrangements and fattening its product line to include VCRs and television sets. STS feels that storefront dealers, to survive, are going to have to be total entertainment centers. With cable TV entering the retail market, STS dealers will be a step ahead of the cable competition by offering complete one-stop shopping for everything offered in consumer electronics.

"I feel sorry for the people who have bought one of those things." I was sitting in a dental office and the dental technician was hanging a bib around my neck. On my lap was an advance copy of the January issue of Home Satellite TV. I asked her why she should be sorry for somebody who suddenly had 130 channels of television.

"Because all of those 130 channels are being scrambled and the money they just spent will have been wasted." I tried to straighten her out, but she had the last word by prying my mouth open with dental gadgets. I pondered why a dental technician, perhaps 25 years old and working in Fort Lauderdale, Florida, would have so much knowledge about home TVRO systems.

"You guys doing something special?" the man asked. Frank Abruzzo, Alli Lake, and I were parked in a back parking lot behind a warehouse. We had a couple of spectrum analyzers and I was loaded down with a TV camera, a 3/4" tape deck, and a still camera. We were 'looking for TI' so I could run off some quick video for a piece I was working on.

We told the man what we were doing.

"Satellite TV? Man, I wouldn't buy one of those things. Every channel on satellite is being scrambled. Why would anybody want to cough up \$3,000 for one of those, anyhow?" Frank tried to straighten him out, but it was apparent he had his mind made-up. His two companions were shaking their heads in agreement as he spoke. Again, I pondered why three guys in their mid-30s, working in a warehouse, would be so smart on satellite TV.

"It happened the week we were all in Washington at Earth Station Day," Frank began. "A local distributor, who said he did not have the time or money to travel to Washington for our celebration, got four other local dealers to parade with him. They procured five trailer rigs and drove around with signs through the towns here and protested at the various city halls. They wanted publicity from cable about the plight of TVRO, and they got it!"

That they did. On the Miami evening news, the quintet received a few brief seconds of coverage followed by perhaps two minutes from local cable spokespeople. TVRO lost that round and the next day, the cable people had a full page advertisement in the area newspapers designed to 'Set The Record Straight About Scrambling.' The advertisement, paid for by local cable firms, plainly accused TVRO dealers of 'not telling consumers the truth' about scrambling. It said that consumers were being 'mis-lead' by 'inexperienced (or dishonest) TVRO dealers.' Individuals reading this advertisement had to put the paper down with just one bottom line thought firmly in mind:

"Satellite TV is being scrambled and people who are buying a TVRO are losing their investment...."

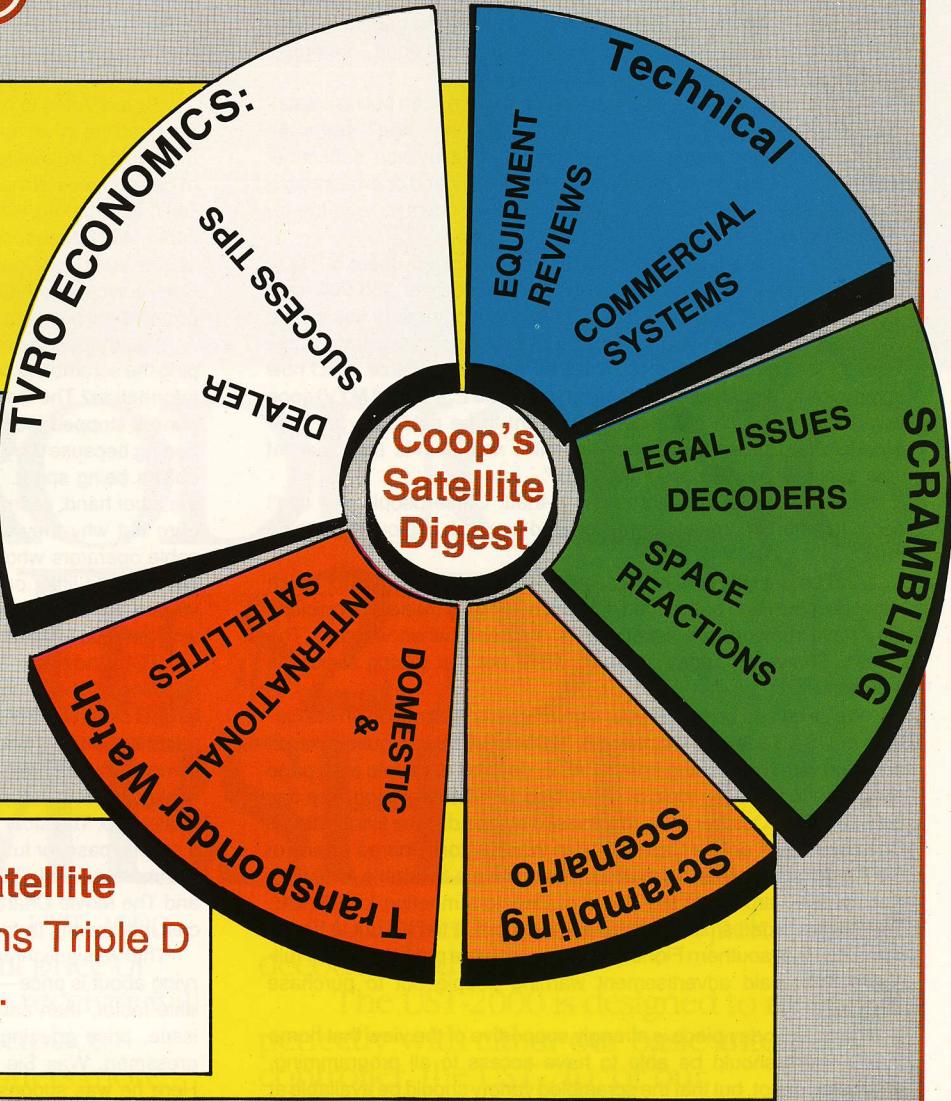
Now I understood why a dental technician and three warehouse workers and a dozen others I had encountered over a few days were suddenly so bright about TVRO. Score one for the cable folks. No,

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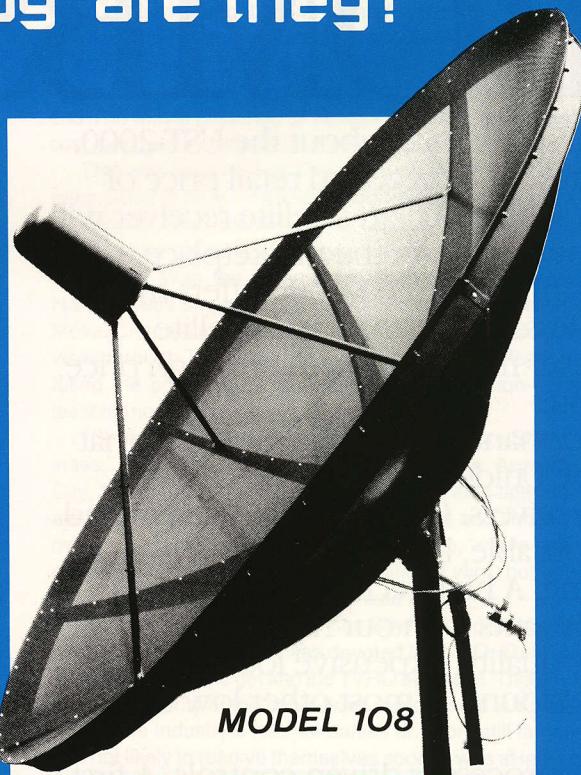
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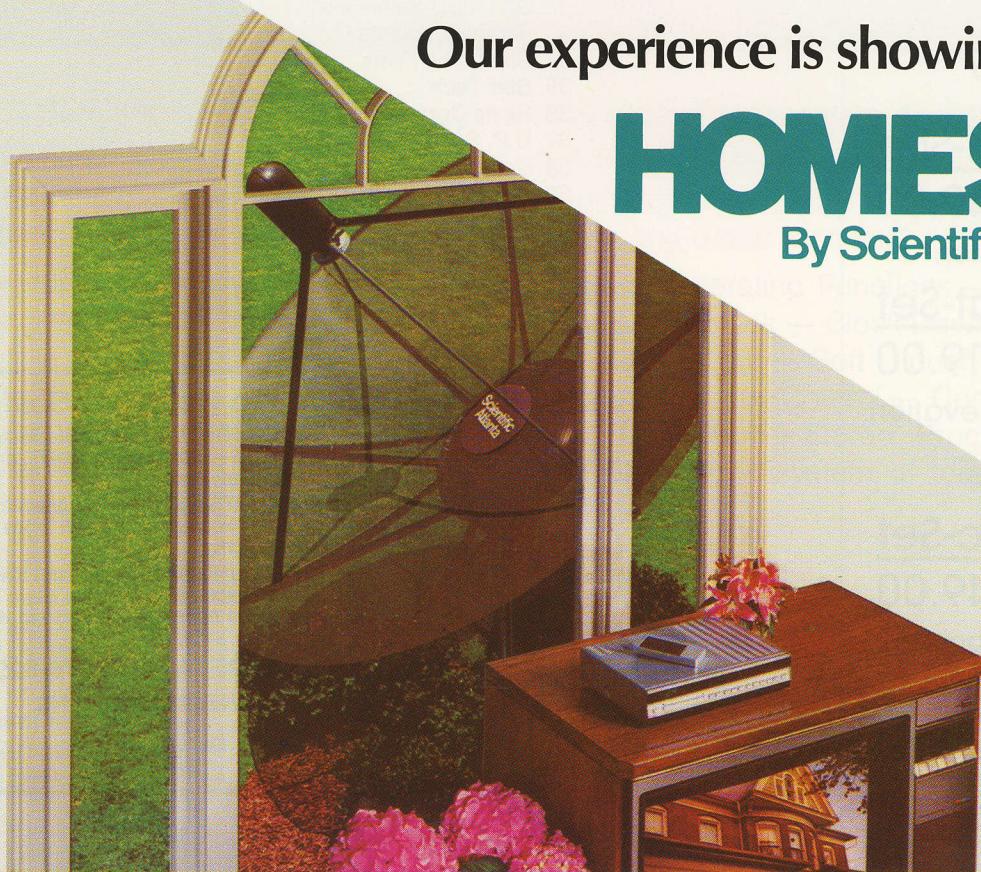
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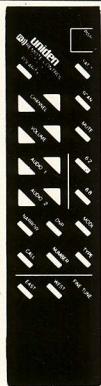
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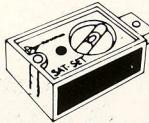
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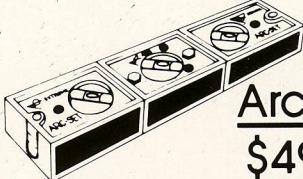
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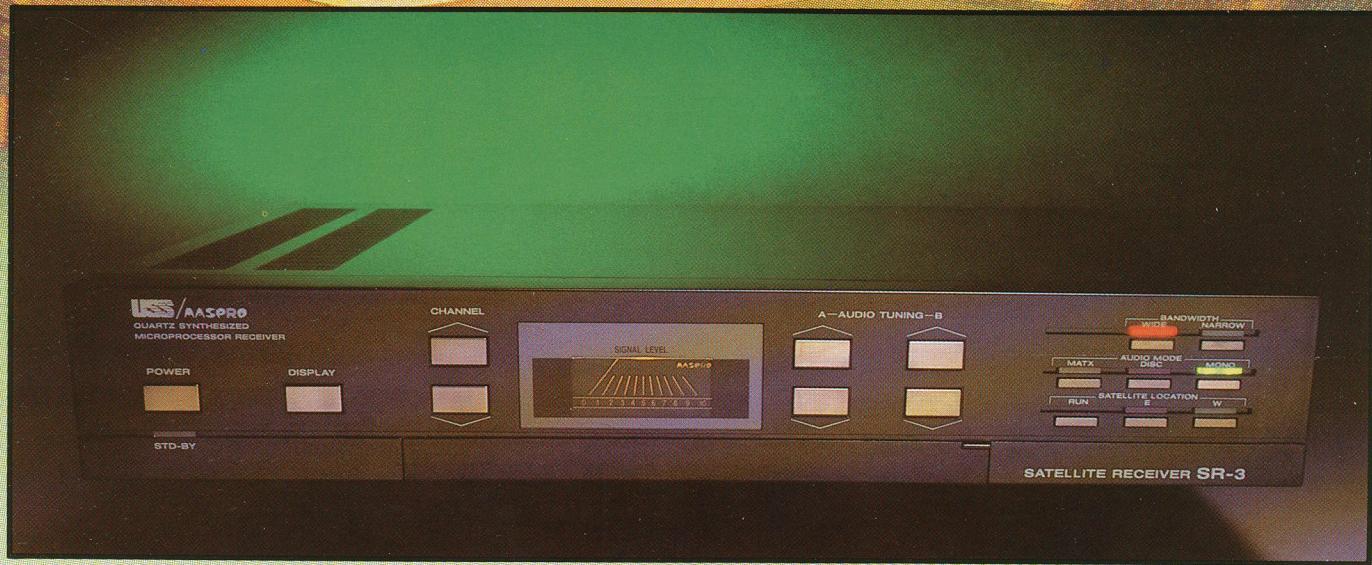
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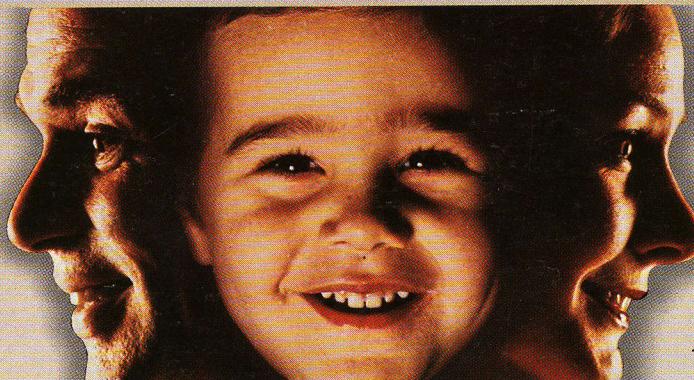
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